DOCUMENT RESUME

ED 147 163 SE 023 341

TITLE	National Environmental/Energy Workforce Assessment for Washington.
INSTITUTION	National Field Research Center Inc., Iowa City, Iowa.
SPONS AGENCY	Environmental Protection Agency, Washington, D. C.
PUB DATE	77
GRANT	EPA-T-900591010
NOTE	129p.; For related documents, see SE 023 292-360; Contains occasional colored pages
EDRS PRICE	MF-$0.83 HC-$7.35 Plus Postage.
DESCRIPTORS	Air Pollution Control; *Career Opportunities; *Educational Programs; Energy; Environment; *Manpower Needs; Pesticides; *Pollution; Post Secondary Education; Radiation; *State Legislation; Water Pollution Control
IDENTIFIERS	Noise; Solid Wastes; *Washington

ABSTRACT

This report presents existing workforce levels, training programs and career potentials and develops staffing level projections (1976-1982) based on available information for the State of Washington. The study concerns itself with the environmental pollution control areas of air, noise, potable water, pesticides, radiation, solid waste, wastewater, and energy. The format includes workforce profiles, projections, growth and career options for each of the areas investigated. Additional sections of the report outline state legislation and selected post secondary institutions with formal Environmental/Energy programs. A state profile and summary is included for cross-reference. The selected bibliography is appended in the Region X report. This document is one in a series of 69 which presents information for each of the states, Washington, D.C., Puerto Rico, and the Virgin Islands, and national and regional summaries. (CS)

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ED147163

A National Environmental/Energy Workforce Assessment

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NATIONAL INSTITUTE OF EDUCATION

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SE 023 341

NATIONAL ENVIRONMENTAL/ENERGY

WORKFORCE ASSESSMENT

for

WASHINGTON

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

1977

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INTRODUCTORY NOTE

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ACKNOWLEDGEMENT

The information contained within this report could not have been compiled without the valuable assistance and support of professionals working in the pollution control agencies in Washington State. Special thanks go to Ms. Karen Rausch who provided valuable insight into training and certification programs in water and waste water. Mr. Glen Fiedler of the Department of Ecology and Mr. Robert L. Wubbena of the Department of Social and Health Services were particularly helpful in supplying information concerning water/waste water activity. Of equal importance was the assistance of Mr. Peter W. Hildebrandt, Air Programs, Department of Ecology; Mr. Avery Wells, Solid Waste, Department of Ecology; and Ms. Virginia Challen, Washington Department of Agriculture. Appreciation is also extended to Mr. Earl Tower for insights into the Model Litter Control Program.

PREFACE

This report identifies existing workforce levels, training programs, career opportunities, and future staffing level projections (1976-1982), based on information available for the State of Washington in the environmental pollution control areas of air, noise, potable water, pesticides, radiation, solid waste, wastewater, and energy. This study was carried out for the United States Environmental Protection Agency by National Field Research Center, Inc., of Iowa City, Iowa.

The information contained in this report was compiled through extensive on-site interviews with professionals working in the respective areas noted above and with telephone interviews and literature research in all areas.

FOREWORD

Information for this report was largely compiled from on-site interviews with professionals working in the various pollution control areas of air, noise, pesticides, potable water, radiation, solid waste, wastewater, and energy. For greater reliability, interviews were followed-up by telephone and mail contact to clarify and revalidate information.

It should be noted that all workforce projections are based on the professional judgement of those persons interviewed.

A review of existing legislation and pertinent program literature provided information concerning program priorities, goals, and objectives. This information was also helpful in identifying future career opportunities.

National Environmental Energy Workforce Assessment

Phase I

WASHINGTON

State Summary

I. AIR

The Air Programs Office of the Department of Ecology (DOE), is responsible for the control and abatement of air pollution. As an adjunct to the state programs, local air pollution control authority is vested in county or multicounty equivalents of DOE.

Presently state and municipal air pollution control activities involve a professional workforce of 93. Industrial air pollution control and abatement activity is estimated to involve 200 professional and technical personnel. Professional disciplines comprising this workforce include engineers, chemists, meteorologists, and technicians.

Many of these individuals have been involved with the environmental aspects of air pollution for a relatively short period of time. This problem, prompted by the recent development of pollution control technology, has created a need for upgrade training at all levels. Constrained by time, money and program availability, this enrichment training goal may not be met.

In 1976 the Office of Air Programs offered training via workshops in plume opacity, high volume sampling, carbon monoxide, and sulfur dioxide for 283 attendees.

Workforce projections indicate a limited growth at the state regulatory level, estimated to be about two percent over the next five years. This figure excludes the municipal effort for which projections were not available.

II. NOISE

The Department of Ecology, Office of Land Programs, Noise Control Section, is the state authority responsible for the control and abatement of noise pollution. DOE workforce activity in noise pollution control involves the full-time efforts of one professional acoustical engineer.

In addition to the state regulatory workforce, engineering consultant firms provide professional expertise to industrial concerns relating to noise specifications in architectural design. However, due to the competitive nature of consulting activities, specific workforce figures were not available in this area.

Municipal enforcement of noise regulations is carried out through state patrol and local city police. At present, eleven cities have adopted noise control ordinances which involve nuisance, zoning, vehicle, recreation vehicle, railroad, aircraft, construction, and building noise pollution standards.

No workforce increases are anticipated to occur over the next five years at the state regulatory level.

Further, in review of limited state activities, the noise effort is expected to continue to be a low priority program. Other noise-related activities, e.g., municipal ordinances, zoning standards, will continue to involve local enforcement bodies which include noise activities as a part of their regular responsibilities.

III. PESTICIDES

The Department of Agriculture, Pesticides Division, is the prime authority responsible for the control and abatement of pesticide misuse and pollution. This agency administers the registration and licensing of pesticide dealers, applicators, and operators. The total staffing level currently involves eleven professional positions.

Approximately 45 pesticide specialists are employed by the Cooperative Extension Service, which provides training services to dealers, applicators, and farmers in preparation for licensing exams.

Private sector workforce activity involves 3,464 pesticide operator/applicator personnel. It has been estimated that 20,000 private farmers will be certified to use restricted-use pesticides in the next five years.

The Department of Agriculture expects no growth increase to occur in the state regulatory workforce. Growth in the number of commercial applicators will be approximately 12 percent per year, however, this estimation could be dramatically lowered as poor weather conditions could hamper agricultural activity in the years to come.

The provision of training pursuant to certification of personnel is expectedly the most important task facing pesticide regulatory authorities at this time.

IV. POTABLE WATER

The Department of Social and Health Services (DSHS) is considered to be the principal authority responsible for maintaining high water supply quality standards in Washington.

The water supply program of DSHS is carried out through its headquarters in Olympia and regional offices in Seattle and Spokane. A total of 23 professional and technical personnel are involved in the water supply program, with the majority of positions filled by sanitary engineers.

Because Washington has yet to establish a mandatory certification program and has only a voluntary certification process, the number of operators holding certificates is fewer than if certification were mandatory. Mandatory certification is anticipated within the next two years. Statewide, there are a total of 1,250 operators who have been certified in accordance with the Association of Boards of Certification Standards.

There are an additional 30 professionals working in water supply through the county health departments. This workforce consists primarily of personnel degreed in sanitary engineering.

In total, there are approximately 1,400 persons in Washington working in the field of water supply, combining both public and private sectors.

Workforce projections indicate no growth at the public level. The number of certified water treatment personnel is expected to increase by 300 over the next five years, thus indicating a definite need for training activity.

V. RADIATION

Regulatory responsibility for radiation control is vested in the Washington Department of Social and Health Services.

At the present time, DSHS has a staff of eight professional personnel conducting all regulatory activities in this area. Although no growth in staff is expected to occur over the next five years, sources have indicated that the workload will continue to increase as licensing and registration activities involve an ever growing number of facilities.

An estimated 134 radiation control technicians are involved in radiation pollution control at the private sector level.

Training for DSHS employees is partially accomplished through ERDA seminars and courses offered by the Nuclear Regulatory Commision. Communication among professional staff members provides for a continuous exchange of state of the art knowledge and for new personnel represents on-the-job training potential.

One of the major concerns to public health officials is the increasing use of nuclear power for electrical generation and its by-product of nuclear waste. The proper handling, transportation, and storage of this waste will require extensive planning in the beginning and equally diligent monitoring during and after storage has been accomplished. All of these activities will provide career opportunities in the future.

VI. SOLID WASTE

The Department of Ecology, Solid Waste/Resource Recovery Division, has been assigned primary responsibility for the control and abatement of solid waste pollution.

DOE maintains a solid waste divisional staff of 25 professionals. This staff is comprised of engineers, sanitarians, scientists, and public relations specialists.

Private sector disposal workforce activity has been estimated to involve some 300 people. This workforce includes landfill owner/operators, heavy equipment operators, and weighmasters.

The private sector workforce profile involving waste collection personnel has been estimated to include some 1,200 people. These collection service personnel work under a franchise system and provide collection services to specific population centers. Personnel in this workforce include drivers, jumpers, and occasionally, heavy equipment operators.

In response to the Resource Conservation and Recovery Act of 1976 and the growing volume of solid waste being produced, DOE anticipates increasing its staff by five professionals over the next five years. Private sector workforce projections indicate an increase of 900 persons over the next five years. In conjunction with increases in staff in the public and private sector, extensive training activity is also expected to develop. This will provide for effective implementation of the state solid waste management plan.

VII. WASTE WATER

The principal regulatory authority responsible for the control and abatement of waste water pollution is vested in the Office of Water Programs, DOE.

The current staffing level of the office involves 53 professional personnel. This workforce is made up of engineers, technicians, scientists, and administrative personnel.

Private sector workforce activity is estimated to include 1,266 persons, comprised primarily of waste water treatment plant operators.

Waste water treatment plant operator training and certification activities are considered to be a major component in the effort to provide efficient treatment facility operation.

Workforce projection information indicates little or no growth at the state level. However, private sector workforce levels are expected to increase by 975 over the next five years. This increase is the result of continued facility construction and upgrade construction at existing facilities.

Sources in the field have suggested that the proper training and certification of operator personnel may increase the efficiency of a treatment plant by 50 percent. This would indicate that operator training in the future will become an important component in the effort to eliminate water pollution in Washington.

VIII. ENERGY

The Washington State Energy Office, in conjunction with the State Energy Advisory Council, is responsible for the development and implementation of programs designed to provide guidance and planning concerning energy production, conservation and conversion activities.

At present, the office is staffed by ten professional personnel. Although future activity is extremely dependent upon federal funding, considering an optimum situation, the State Energy Office could feasibly increase its staff to 40 professional positions within the next five years.

Sources in the field have indicated that the effects of the energy extension services concept, the weatherization program, and the RCRA of 1976 will all provide growth potential for their office programs and staff necessary to accomplish those programs. Positions to be added will include engineers, public information specialists, nuclear specialists, administrators, and generalists with B.A./B.S. backgrounds.

The Washington State Energy Office offers assistance and information concerning energy conversion and conservation, but offers no specific training programs. Personnel training is developed primarily through structured university programs and experience in the field. Energy seminars may be developed in the future to promote energy conservation in the public sector.

STATE OF WASHINGTON - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	227	275	315	355	390	430	14%
NOISE[2]	1	1	1	1	1	1	0%
PESTICIDES[3]	11	11	11	11	11	11	0%
POTABLE WATER[4]	1,279	1,347	1,411	1,489	1,531	1,573	4%
RADIATION[5]	163						n/a
SOLID WASTE[6]	325	397	465	539	582	630	14%
WASTEWATER[7]	1,259	1,486	1,650	1,764	1,926	2,134	11%
ENERGY[8]	10	20	25	30	35	40	35%
TOTALS	3,275	3,537	3,878	4,189	4,476	4,819	8%

[1]The above does not include 66 municipal positions for which projections were not available (re: Washington report).

[2]The above does not include law enforcement agencies or the private sector for which figures were not available.

[3]The above includes 11 state staff, but does not include 3,464 licensed applicators/operators, 1,373 commercial and public pest control consultants, or the estimated 20,000 farmers who may be certified by October, 1977. The only anticipated growth is 12% per annum for commercial applicators/operators.

[4]The above does not include laboratory personnel. Of the figures, the state agency segment is 29 in 1976 and 23 in 1981. (re: Washington report).

[5]The above includes 8 state agency personnel and 155 technicians statewide. Projections were not available.

[6]The above reflects 25 state agency personnel in 1976 and 30 by 1981. The remainder are disposal personnel.

[7]The above includes 53 state agency personnel for which no growth is anticipated. The figures do not include laboratory personnel.

[8]These projections are entirely dependent upon future federal funding. If funding continues, the office may have 40 personnel by 1981.

EDUCATION

Environmental education is offered through various educational disciplines in approximately 75% of the post-secondary institutions in Washington State. Although the majority of institutions offer environmentally-related courses, only three offer programs large enough to impact the future workforce.

The Washington State Council for Post-secondary Education identified these institutions: (1) University of Washington, Seattle; (2) Huxley College of Environmental Studies, Bellingham; and (3) Evergreen State College, Olympia. These schools utilize different approaches to environmental education. The University of Washington offers numerous courses in a variety of disciplines under the traditional system of education within the University structure. Huxley College offers several concentrations aiming the student at a particular discipline within Huxley, which is a cluster college of Western Washington State College, and offers strictly environmental science courses. The third and most untraditional of the three institutions is Evergreen State College. It offers self-designed majors with emphasis on field work.

The State Report provides an analysis of the programs available through Green River Community College and Huxley College of Environmental Studies.

LEGISLATION

The environmental/energy legislation for Washington was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Department of Ecology Law

Environmental Coordination Procedures Act

Clean Air Act

Noise Control Act of 1974

Pesticide Application Act

Pesticide Control Act

Nuclear Energy and Radiation Law

Hazardous Waste Law

Model Litter Control Act

Solid Waste Management Act

Water Pollution Control Law

Water Resources Act of 1971

Water Code of 1917

State Energy Office Law

Shoreline Management Act of 1971

National Environmental Energy
Workforce Assessment

Phase I

WASHINGTON

State Report

STATE PROFILE

The State of Washington, nicknamed the Evergreen State for its vast coniferous forests and its equally abundant yearly rainfall, spans across a total of 66,000 square miles located in the northwest corner of the continental United States.

Early settlers began logging this area long before 1889 when the last of the Northwest Territories became the 42nd state of the Union. Since that time, logging and associated forest products industries have continued to grow.

Currently, forest products industries employ approximately 65 thousand people with a total income of over 700 million dollars per year. In the past few years, however, public concern has grown over the environmental effects of current logging practices. As a result of this recent public exposure, the Environmental Protection Agency (EPA) has published Logging Roads and Protection of Water Quality, a report containing guidance that will enable forestry managers to take the preventive steps that offer workable solutions to non-point source problems. Also, in draft form, the Region published this year the report Forest Harvest - Regeneration Activities and Protection of Water Quality, a state of the art technical reference of methods, procedures and practices relating to forest harvesting, residue management and reforestation operations.

In addition to the forestry resource, Washington has a highly developed fisheries industry which employed 90,000 people in 1974 and provided income to Washington residents totaling $187,555,607.

Seasonal restrictions govern much of the activity in forestry and fisheries, along with the $1,955.2 million agricultural industry. Much of the remaining economic support is based on manufacturing in the aerospace, ship, and truck areas, along with the production of one-third of the nation's aluminum.

According to the 1975 census reports, Washington's total population is 3,494,124. The majority of the people, about 70 percent, live in a ten county area located in the western corridor of the state. This corridor stretches from the northern border along Canada southward to the border of Oregon, paralleling the Cascade Mountain Range.

WASHINGTON POLLUTION CONTROL AND ABATEMENT AGENCIES

The Washington Department of Ecology is the principal state environmental agency. This agency has been assigned primary responsibility for the development, administration, and maintenance of programs providing for pollution control and abatement in the areas of air, noise, water resources, solid waste, and wastewater. Additional state agencies concerned with environmental protection include the Department of Social and Health Services, the Department of Agriculture, and the Washington State Energy Office.

The Department of Ecology (DOE) was created in recognition of the responsibility of state government to plan, coordinate, restore and regulate the utilization of natural resources in a manner that will protect and conserve clean air, pure and abundant waters, and the natural beauty of the state. To meet this responsibility, DOE was formed to manage and develop air and water resources in an orderly, efficient, and effective manner and to carry out a coordinated program of pollution control involving these and related land resources. Since conception, DOE has organized its efforts through the establishment of five operational offices:

1) Office of Comprehensive Programs;
2) Office of Air Programs;
3) Office of Land Programs;
4) Office of Water Programs;
5) Office of Field Operations.

In total, DOE maintains a professional and technical staff of 185. This staff includes engineers, chemists, sanitarians, meteorologists, technicians, and scientists. A chart depicting the organizational structure of DOE will follow this section.

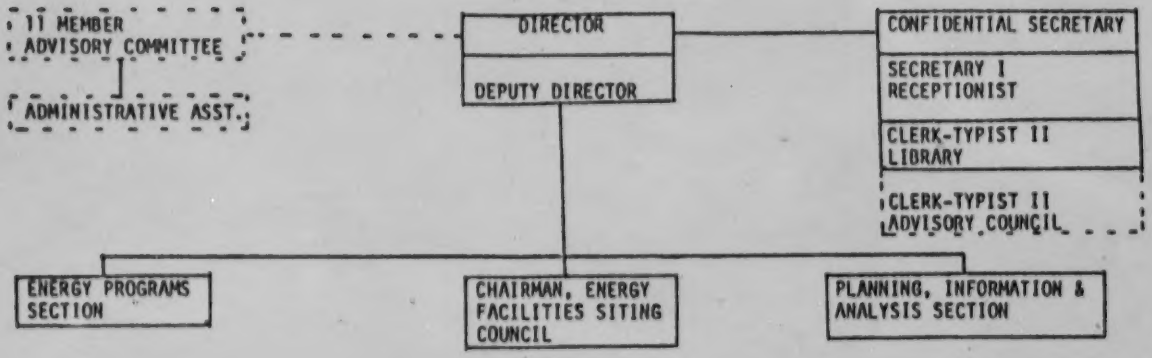
The Department of Social and Health Services (DSHS) is responsible for the administration and maintenance of a program which will provide adequate high quality drinking water to the rural and urban populus of Washington. Within DSHS, the Water Supply and Waste Section carries out a number of programs aimed at maintaining state drinking water standards and improving water system operation. The departmental staff working on water supply total 29, which include engineers, scientists, and technicians.

The Department of Agriculture (DOA) is the state lead agency for the control of pesticide use. This is carried out through a program of monitoring, certification, and education, with the assistance of state extension services and regional agricultural offices. This agency is responsible for regulating the use of agricultural pesticides, licensing pesticide users, and providing a certification program for pesticide applicators. There are a total of 11 professional staff members who administers, conducts inspections, and manage licensing and certification activity.

The Washington State Energy Office (WSEO) was created to foster wise and efficient energy use and to promote energy self-sufficiency through the use of indigenous and renewable energy sources, consistent with the promotion of reliable energy sources, the general welfare, and the protection of environmental quality. There are approximately ten professionals providing coordination and support to this program. An organizational chart follows this section.

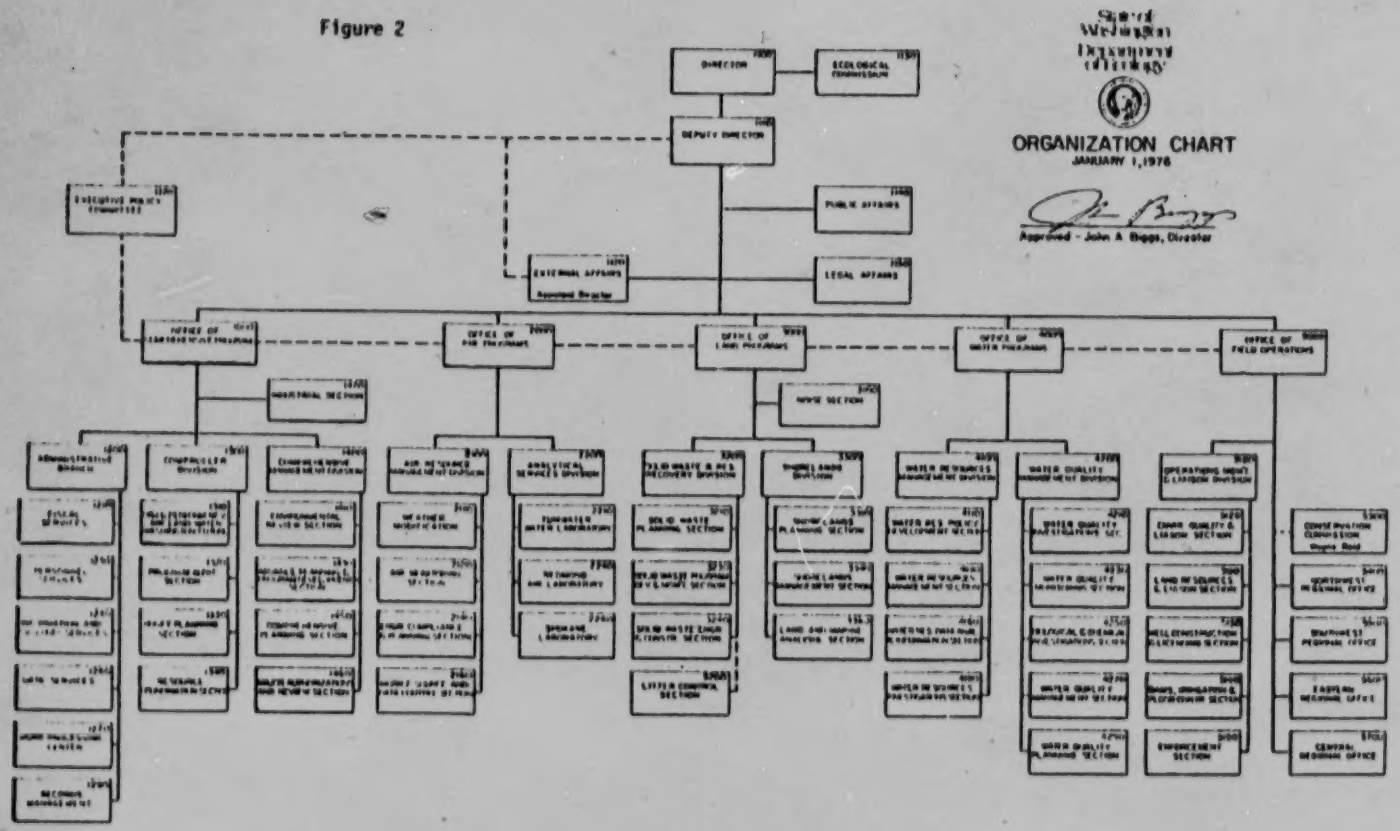
WASHINGTON STATE ENERGY OFFICE

Figure 1



PROGRAM COORDINATOR	ASSISTANT DIRECTOR	ASSISTANT DIRECTOR
ENERGY MANAGEMENT COORDINATOR		PROGRAM PLANNER
ENERGY MANAGEMENT COORDINATOR		RESEARCH ANALYST
ENERGY MANAGEMENT COORDINATOR		INFORMATION OFFICER

Figure 2


ORGANIZATION CHART
JANUARY 1, 1976
Approved - John A. Biggs, Director

Pollution Control and Abatement Programs

I. AIR

A. Introduction

Primary responsibility for the state air pollution control and abatement programs is within the Office of Air Programs of the Washington Department of Ecology (DOE). Its current program includes considerable cooperation and involvement with industry and state/local agencies in the public sector. The local air pollution authority is vested in county or multi-county equivalents of DOE which are responsible for enforcement of established standards.

The Air Programs Office has jurisdiction over all sources in those counties which do not have ongoing local compliance or enforcement programs. Further, because of their importance as major sources of contaminants, the Office has assumed jurisdiction over primary aluminum plants, pulping mills and vehicle-related sources. Current programs also include compliance schedules for all those sources under State jurisdiction which are not already in compliance with standards. Under regulatory orders from the Department, sources are placed on schedules for achieving compliance, with intermediate goals established as departmental checkpoints. Local authorities operate similar programs. Major sources must also submit monthly reports of emissions sampling results.

To date, the program, which has enjoyed industrial cooperation, has demonstrated its effectiveness. Kraft mills particulate emissions have

been reduced by 80 percent at an estimated cost of 115 million dollars. Sulfite pulp mills (6 of the 7 in the nation are in Washington) have reduced particulate emissions by 50 percent and sulfur dioxide by 70 percent over the past 4 years. With regard to the aluminum industry, (nearly 60 percent of the nation's aluminum is produced in Washington), it has reduced its ambient and forage fluoride emissions by 60 percent, although the cost was high--an estimated 85 million dollars.

Motor vehicles represent a major problem and the Department continues its efforts towards meeting existing and anticipated forthcoming emissions standards. The current approach to the problem is to educate the public and service industry to the benefits of proper maintenance by enforcing the anti-tampering regulation (removal or adjustment of installed equipment), vocational instructor and mechanic training, performing free emission checks for the public, and testing for fleet vehicles. To this end, Seattle and Spokane will participate in EPA's emission testing program "The Gas Saver Check" beginning next May. EPA will encourage auto service shops and garages to offer motorists a one-minute idle check of the exhaust using an infrared gas analyzer, at no cost to the motorist. Moreover, since the carbon monoxide standard is being exceeded in both downtown Seattle and Spokane, the Department is presently developing more rigorous standards to combat the problem. However, the Department is awaiting federal action regarding federal emissions standards before action plans can be formalized and implemented.

B. Workforce Profile

The DOE Office of Air Programs is divided into four sections: Weather Modification, Air Monitoring, Engineering Compliance and Planning, and Mobile Source and Data Control. Headquarter operations are located in Olympia with analytical laboratory facilities in Redmond, Washington. The total staffing level of the DOE office, including the laboratory, is 27, the majority of which are comprised of engineers, technicians, and chemists. Table I lists personnel by position title.

TABLE I

WASHINGTON DEPARTMENT OF ECOLOGY
Office of Air Programs
Current (1976) Staffing Level

Position	1976
Engineer	2
Meteorologist	2
Scientist	8
Technician	11
Other	4
TOTAL	27

The technicians are primarily instrument technicians with responsibility for the operation and maintenance of an air monitoring network. The four positions listed under "Other" include chemists with both two and four-year degrees.

Three authorized positions are currently listed as vacant. These positions include two air quality engineers and one instrument technician.

Seven air pollution control authorities contribute to abatement activities on the municipal level. These list as follows: Benton-Franklin-Walla Walla counties, Northwest, Olympic Region, Puget Sound, Southwest, Spokane County, Yakima County. Professional and technical positions listed in Table II represent the current statewide staffing level of these agencies.

TABLE II
STATE OF WASHINGTON

Municipal Air Pollution Control Programs
Current (1976) Staffing Level

Position	1976
Engineer	8
Meteorologist	3
Scientist	27
Technician	13
Attorney	4
Other	11
TOTAL	66

Personnel listed in the category "Other" are administrative positions currently involved with the administration of municipal authorities. The "Scientist" category includes scientific supervisors, chemists, and inspectors.

Public and private sector sources estimate that there may be up to 200 professional and technical personnel working in air pollution control and abatement in industry. The majority of this workforce is employed by the pulp and paper industry, the aluminum reduction plants, the oil refining industry, and various metal smelting installations across the State. Approximately 50 percent of this workforce is comprised of engineers, e.g.,

civil, mechanical, electrical, and chemical, and scientists, e.g., chemists and meteorologists. The remaining 50 percent are primarily technicians, most of whom are skilled in instrumentation and electronics. Large corporations have indicated that more and more short-term problem solving work is being done by consultants, and that this trend will assuredly continue.

Table III represents the current private sector air pollution control workforce.

TABLE III

STATE OF WASHINGTON

Industrial Air Pollution Control Programs
Current (1976) Staffing Level

Position	1976
Professional	75
Technical	125
TOTAL	200

C. Workforce Projections

All workforce projections regarding the air quality control programs are based on the best professional judgements of persons experienced in air pollution control at the state and private sector levels. Future insights and state of the art information of particular importance were provided by Mr. Pete Hildebrandt, Assistant Director Air Programs, DOE; Mr. Dick Burkhalter, Industrial Section, DOE; Mr. Robert Welch, Environmental Pollution Director of the ASARCO Steel Smelter in Tacoma; Mr. Stan Cheatham, Intalco Aluminum Corporation; and Mr. Warren Mowry, Georgia-Pacific Corporation.

Over the next five years, the Office of Air Programs expects no increase in their present staffing level. This conclusion is based on the current industrial compliance status, which as indicated by all sources, meets with 1975 compliance standards. It should be pointed out that the growth in the engineer and technician positions is a result of current vacancies being restaffed. Staffing projections for the next five years are shown in table IV.

TABLE IV

WASHINGTON DEPARTMENT OF ECOLOGY
Office of Air Programs
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	2	4	4	4	4	4	5%	20%
Meteorologist	2	2	2	2	2	2	5%	0%
Scientist	8	8	8	8	8	8	5%	0%
Technician	11	12	12	12	12	12	5%	2%
Other	4	4	4	4	4	4	n/a	0%
TOTAL	27	30	30	30	30	30		2%

The calculations used to determine the percent per annum growth and turnover rate averages were developed by calculating a by-year percent change, then totaling and averaging those numbers to give a five-year average figure. All subsequent figures will be calculated in the same manner.

Municipal air pollution authorities anticipate no growth over the next five years. Although federal legislation concerning regulatory activity involving sulfur dioxide standards may create an increased workload,

which will necessitate a slightly larger workforce, specific disciplines needed in this case have yet to be identified.

Workforce projections regarding the private sector were obtained through on-site interviews with private sector professionals engaged in air pollution control activities in Washington. During the course of the interviews, professionals were asked to provide their best professional estimate of workforce projections.

For the most part, these projections were dependent on future regulations and standards, but a concensus of opinion indicates a growth rate of approximately 15 percent per annum. This growth rate will be a result of increased workload based on more stringent state and federal ambient air quality standards.

It has been indicated by a number of professionals in the field that a trend toward the use of consultant organizations in short-term problem solving situations will continue in the years to come. In addition, other sources suggest that as much as 50 percent of the work in air pollution control and abatement will be carried out by consulting engineering firms.

The estimated workforce growth in the private sector is represented in Table V following. Professional positions include degreed engineers, chemists, and meteorologists. Technical positions include personnel with associate degree level training and personnel who have received on-the-job training.

TABLE V

STATE OF WASHINGTON

Industrial Air Pollution Control Programs
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum growth (average)
Professional	75	95	110	125	135	150	13%
Technical	125	150	175	200	225	250	15%
TOTAL	200	245	285	325	360	400	15%

For the most part, engineers have assumed the role of corporate environmental officials. Workforce positions held by technicians, scientists, engineers, and meteorologists are responsible for environmental policy planning, long-range planning of facilities and equipment, conducting environmental studies, preparing environmental impact statements, maintaining an up-to-date knowledge of new rules and regulations, and providing assistance to plants in solving air pollution control problems. Laboratory and engineering departments frequently provide part-time services to aid in pollution control activities. These departments are often responsible for plant conditions such as control of fumes and hazardous chemicals, in accordance with Occupational, Safety, and Health Administration (OSHA) regulations.

Most industries tend to avoid hiring college graduates who lack experience in the field. Student intern programs are used by some corporations to train and identify prospective employees who have requisite skills and are thought to be easily trainable. Recruitment of personnel into the environmental field often originates with existing employees. Knowledge of company operations and policy are thought to provide a well-rounded base for building a company-minded environmental official.

D. Training and Certification

The Office of Air Programs conducts a plume opacity recertification program twice yearly at Shoreline Community College, Seattle, Washington. It is a requirement that persons wishing to maintain their smoke reader certification be recertified yearly. In 1976, 80 people attended the recertification class.

Workshops concerned with various aspects of air pollution are put on through the Office of Air Programs. The following lists the workshops of 1976 and the enrollment by subject.

In Attendance	Workshop
40	High Volume Sampling
100	Carbon Monoxide
63	Sulfur Dioxide

It has been indicated by professionals at the State level that EPA seminars are good in content, but the high cost of these seminars severely restrict the attendance of personnel who are in need of training. It is felt that a reduction in tuition fees and the addition of travel assistance to personnel in outlying areas, would develop higher attendance and more effective results in seminar training programs.

E. Career Potential

Minimal workforce growth is anticipated by professionals in both the public and private sector regarding air pollution control. Accordingly, career opportunities will be limited. Only personnel with the

highest of qualifications and extensive experience can expect to obtain employment in this area.

Of both sectors, private industry will provide the most lucrative and obtainable career opportunities in this area over the next five years. Sources in the field indicate that personnel with traditional natural science degrees, established with rigorous emphasis in physics, chemistry, mathematics, and writing skills, will be considered most eligible for employment.

F. Conclusion

At present, the air pollution control field is staffed primarily by individuals holding degrees in engineering, meteorology, chemistry, and law. Many of these individuals have been involved with the environmental aspects of air pollution for a relatively short period of time. This problem, prompted by the recent development of extensive technological advances, has created a need for upgrade training on almost all levels. Due to time constraints, financial restrictions and training availability, this need will not be fulfilled under the present training program.

There are expected to be few workforce opportunities in the public sector because of insufficient funding, whereas the private sector is expected to experience minimal to moderate growth as a result of more stringent air pollution standards. Personnel who wish to seek employment in this area are advised to develop educational backgrounds in engineering, chemistry, and meteorology, with additional expertise in environmental science. On the two year vocational/technical level, positions

will be available for personnel trained as laboratory technicians and as data processing personnel.

II. NOISE

A. Introduction

In 1974, the Washington State legislature passed a noise control act. This act has yet to receive funding. Within DOE, the Office of Land Programs, Noise Control Section, one person is held responsible for the development and management of all noise control programs. The Office is currently operating on a $33,000 budget which has been appropriated from the Department of Ecology's general fund.

B. Workforce Profile

In addition to the one acoustical engineer employed by the DOE, there are several engineering consultant firms which have acoustical engineers available. Noise control laws applying to motor vehicles went into effect July, 1975, with enforcement responsibility delegated to the State Patrol and local county and city police. Don Actor, Chief of Police, Bureau Operations for King County Public Safety Department, has pointed out that the county does not have the sound-measuring equipment needed to enforce the law and that is apparently the case with local police and sheriffs throughout the State. Police at this time respond to complaints with efforts to get cooperation from offenders rather than fine the violator.

Eleven cities in Washington have municipal noise control ordinances. They are Bellevue, College Place, Medina, Pullman, Richland, Seattle,

Snohomish, Spokane, Tacoma, Walla Walla, and Yakima. These ordinances are shown in the following table which is adapted from Sound and Vibration, December, 1976, Clifford R. Bragdon, Contributing Editor.

TABLE VI

STATE OF WASHINGTON
Municipal Noise Ordinances (1975)

City	Nuisance	Zoning	Vehicle	Rec/ Vehicle	Rail- road	Air- craft	Con- struction	Build- ing
Bellevue	-	x	-	-	-	-	-	-
College Pl.	0	-	x	-	-	-	-	-
Medina	x	-	x	-	-	-	x	-
Pullman	x	x	0	-	-	-	0	-
Richland	-	x	-	-	-	-	-	-
Seattle	0	-	x	-	-	-	-	-
Snohomish	x	x	x	-	-	x	-	-
Spokane	0	0	-	-	-	-	-	-
Tacoma	-	x	-	-	-	-	-	x
Walla Walla	0	-	0	0	0	-	0	-
Yakima	0	-	0	-	-	-	0	-

KEY: X Regulations including acoustical criteria
0 Regulations not including acoustical criteria
- No regulations

The ordinances are enforced by local law enforcement authorities in response to complaints. The omission of acoustical criteria in the ordinances means that the regulations are nonquantitative and therefore difficult to enforce.

C. Workforce Projections

No major change in workforce activity is expected over the next five years by DOE Noise Section personnel.

The continued use of consultants will provide Washington industries with sufficient part-time problem-solving capabilities.

D. Training and Certification

Training activity will be in the form of EPA seminars. EPA has identified a need to train state and local officials in the enforcement of land-use standards (the maximum environmental noise levels which are set according to zoning regulations). Police and health department staffs are in need of training so that motor vehicle standards can be properly enforced.

E. Career Potential

Since workforce activity is small and noise control continues to be a low priority program, there is little evidence that a significant number of career opportunities will develop over the next five years.

F. Conclusion

At the present time, there is little effort being expended toward the control of noise pollution. As a result of public awareness, priorities on the federal and state level may change in the near future. If this occurs, training and equipment will be needed to provide for adequate enforcement capabilities.

III. PESTICIDES

A. Introduction

The Washington Pesticide Control Act may be cited as Washington's primary pesticide law. This act provides regulations concerning registration of pesticides, licensing of pesticide dealers, licensing of pest control consultants, and the creation of a pesticide control board.

The Pesticide Control Board has four members which include the Dean of the College of Agriculture, Washington State University; the Secretary of the Department of Social and Health Services; the Director of the Department of Ecology; and the Director of the Department of Agriculture. This Board was created to assume the continuation of state policy concerning the protection and improvement of Washington's environmental quality. A yearly meeting of the Board prior to November 1 is used to provide decisions on pesticide classification and in making determinations concerning restriction of persistent pesticides.

The Department of Agriculture, Pesticides Division, is the prime authority responsible for the control and abatement of pesticide misuse and pollution. This agency administers the registration and licensing of pesticide dealers, applicators, and operators. The total staffing level currently involves eleven professional positions.

B. Workforce Profile

Workforce information contained within this section was obtained through on-site interviews with professionals working in the Pesticide Division. Because the majority of agricultural activity occurs in the eastern half of Washington, the Department has staffed its Yakima office with eight of the eleven professionals which constitute the division. The remaining three professionals are located in Olympia.

Table VII represents the current staffing level by position title.

TABLE VII

WASHINGTON DEPARTMENT OF AGRICULTURE
Pesticide Division
Current (1976) Staffing Level

Position	1976
Administrator	3
Investigator	8
TOTAL	11

The personnel listed as investigator have degrees in biology, botany, and entomology. Administrative personnel have degrees in similar educational disciplines with extensive field experience in pesticide use and control.

Sources in the field have indicated that approximately 45 pesticide specialists are employed by the Cooperative Extension Service, which provides training services to dealers, applicators, and farmers in preparation for licensing exams. More detailed information concerning the training activity will be provided in the training and certification section.

The Pesticide Division has licensed a total of 3,464 applicators and operators in both aerial and ground use categories as of December, 1976. Table VIII lists the licenses issued by category.

TABLE VIII

DEPARTMENT OF AGRICULTURE
Pesticide Division
Licenses Issued (1976)

Class	1976
Applicators - Aerial	115
Applicators - Ground	261
Operators - Aerial	318
Operators - Ground	797
Operators - Public	1,973
TOTAL	3,464

The Olympia Branch Office registered 4,148 pesticide products and licensed a total of 2,103 dealers and consultants. Specific numbers for 1976 are in Table IX.

TABLE IX

DEPARTMENT OF AGRICULTURE
Olympia Pesticide Branch
Licenses and Registration (1976)

	1976
Pesticide Products Registered	4,148
Pesticide Dealers Licensed	595
Pesticide Dealer Managers Licensed	135
Commercial Pest Control Consultants Licensed	1,110
Public Pest Control Consultants Licensed	263

Professionals in the Pesticide Division have estimated that approximately 20,000 farmers will be certified to use restricted-use pesticides by October, 1977.

C. Workforce Projections

Information concerning workforce projections was collected through on-site and telephone interviews with professionals in the pesticide field.

The Department of Agriculture, Pesticide Division sources have indicated that since 1973 their staff has increased dramatically with the addition of five inspectors. At present, they feel their staff is now large enough and will be capable of accomplishing their required duties for the next five years. This capability is primarily due to the assistance of EPA through the upgrading of pesticide sampling techniques and financial assistance to provide better field equipment. The Department feels that they are in a healthy position to deal with the future.

Sources in the field suggest that growth in the number of commercial applicators will be approximately 12 percent per year, however, this estimation could be dramatically lowered as poor weather conditions could hamper agricultural activity in the years to come.

Turnover rates in the public sector are relatively low, approximately five percent per year. The annual turnover rates among the labor crews of commercial applicators is reportedly high, approximately 30 percent. This high turnover rate results from the seasonal nature of the job and the comparatively low pay.

D. Training and Certification

The Washington Department of Agriculture has developed a training program through the State Cooperative Extension Service operated by Washington State University and the University of Washington. Some 5,000 farmers have received training through this service and it is expected that an additional 15,000 will receive training prior to October, 1977. Training is conducted through one-day seminar sessions offered by the Cooperative Extension Services located in each county. These seminars are broad-based in content and are designed to prepare applicator personnel for certification.

Upper level training is available for pesticide specialists through universities and community colleges at several locations across the State. The post-secondary educational system offers a wide range of training opportunities including graduate level degree programs.

E. Career Potential

Increases in the number of commercial applicators will provide career opportunities in years to come; however, because agricultural activity is very dependent upon climatic conditions, job security remains relatively low. Jobs on applicator crews are continually available because of the high rate of employee turnover. However, because of the seasonal nature of the job, the low pay, and lack of opportunities for advancement, such jobs do not offer particularly desirable long-term career choices.

Public sector career opportunities available in the future will involve hazardous waste disposal, pesticide inspection, and research activities in integrated pest management technology. These activities will require personnel with backgrounds in agricultural science and a knowledge of the pesticide industry. Although no major workforce increases are expected, attrition and turnover will provide for some career opportunities in this area.

F. Conclusion

Employment opportunities in the public sector will be limited in the future, although some growth may result from increased regulatory responsibility. With the many technological advances and the increasing use of integrated pest management practices, there seems to exist a continual need for upgrade training in both the public and private sector workforce. The provision of this training and the training of pesticide applicators may well be the most important task facing pesticide regulatory authorities at this time.

IV. POTABLE WATER

A. Introduction

The State of Washington has operated a water supply program for more than 40 years, based upon a legislative charge (RCW 43.20) given first around the turn of the century and revised in 1969.

In 1969, a special public Ad Hoc Committee was formed to assist in developing a State strategy and program to address the problems found in the 4,300 water systems. The review attempted to establish a program of prevention rather than correction and a program that would minimize the need for a State regulatory staff.

As a result of the Committee and staff efforts and a continuing review of the needs, the following problems and need areas were identified:

1) A need for current standards and regulations of all public water.

2) A current inventory of systems and problems.

3) A need for coordinated utility planning.

4) A need for fiscally sound capital improvement programs to eliminate facility deficiencies.

5) A need for qualified system managers or operators.

6) A complete laboratory support program to assist in monitoring the quality of water served to the public.

7) A financial assistance program to help eliminate health-related deficiencies and to assist in developing regional water systems to meet expanding urban area demands.

8) A comprehensive State water supply program that will assist local government, as the lead agency in developing public water systems to meet the defined needs of the State.

Based on the above analysis, a comprehensive effort to develop an effective State program was initiated. The current "Rules and Regulations of the State Board of Health Regarding Public Water Supplies" were adopted in January, 1971. These regulations set forth the outline and program that has been followed since that time.

Of the problems identified by the Ad Hoc Committee, many have been resolved through the efforts of the Department of Social and Health Services as follows:

1) The Board of Health water supply regulations have been completely revised.

2) Cross connection control programs have been instituted in many of the larger utilities and procedures established for certifying backflow prevention devices.

3) Fifteen local water utility coordinating committees have been established throughout the State in urban areas to minimize utility conflicts and to begin a process for the development of a coordinated and eventually integrated system of water supply facilities in urban areas.

4) Automatic data processing systems have been developed for water system facilities, for bacteriological and chemical quality data.

5) The water supply program has been coordinated with water resource planning through an interagency agreement and contract with the DOE pursuant to the Water Resources Act of 1971. Other cooperative efforts in well-drillers' licensing and operator training have also been successful in amplifying limited program resources and improving program and effectiveness.

Although many advances have been made over the past few years, new problems and unresolved problems of the past require vigilant planning, management, and enforcement efforts on behalf of the Department of Social and Health Services and its municipal counterparts.

Some of the problems facing the agency at this time are unqualified or poorly qualified personnel operating drinking water systems, inadequate bacteriological and chemical quality monitoring ability, and less than adequate revenue for small and remotely located systems to properly operate their water systems.

The role of the Department of Social and Health Services in the State water program is summarized in Figure 3, with the many administrative programs of the Water Supply and Waste Section depicted in Figure 4.

Figure 3

Role of the Department of Social and Health Services in the State Water Program

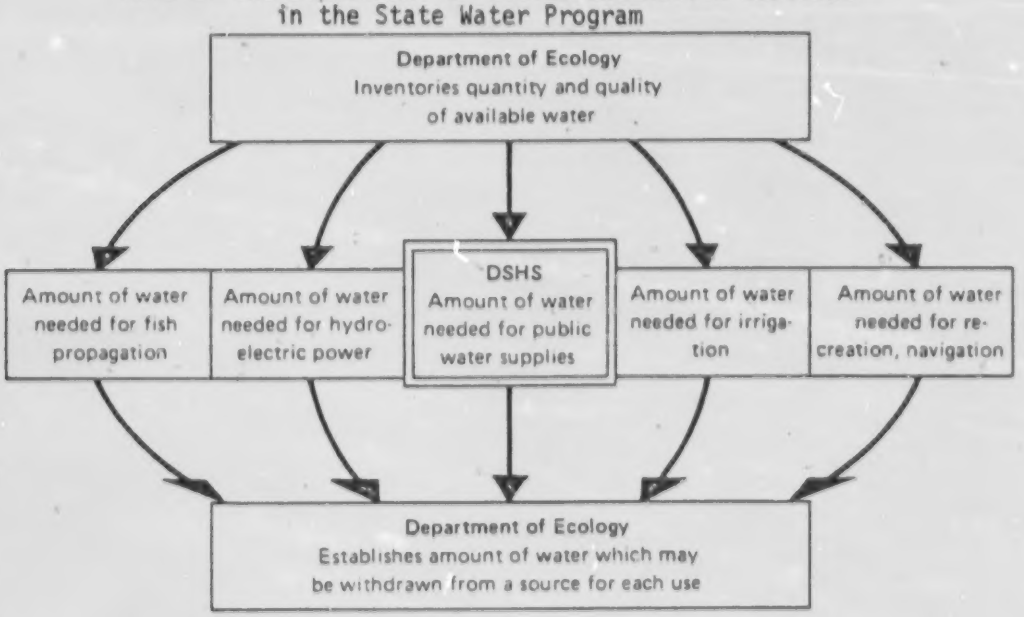
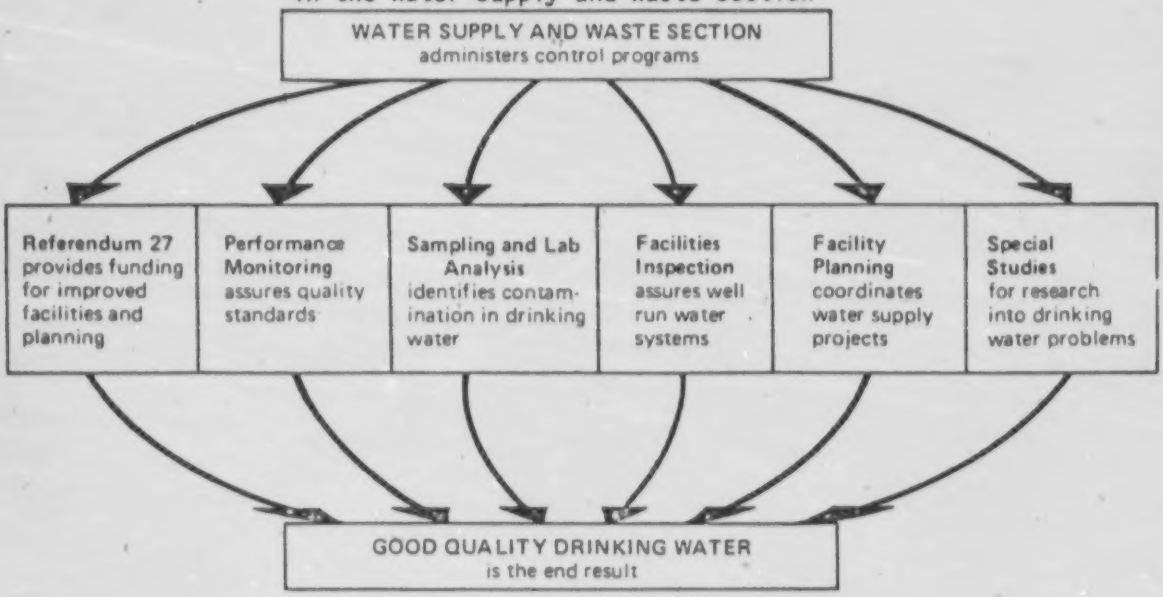

Department of Ecology
Inventories quantity and quality of available water
Amount of water needed for fish propagation
Amount of water needed for hydro-electric power
DSHS
Amount of water needed for public water supplies
Amount of water needed for irriga-tion
Amount of water needed for re-creation, navigation
Department of Ecology
Establishes amount of water which may be withdrawn from a source for each use

Figure 4

Role of the Department of Social and Health Services
in the Water Supply and Waste Section



B. Workforce Profile

Information for the workforce profile was obtained through on-site and telephone interviews with personnel from DSHS and DOE. Of particular assistance in the collection and compilation of data was Mr. Robert Wubbena of DSHS, Water Supply and Waste Section.

As the regulatory body for the water supply in Washington, DSHS is responsible for numerous programs, the most significant one resulting from voter approval of Referendum 27. Other important programs include performance monitoring, sampling and lab analysis, facilities inspection, facility planning, special studies, and training and certification. It is important to remember that these activities are interrelated. Together,

they constitute the state's role in meeting the overall goal of providing an adequate amount of safe drinking water to Washington residents.

A public water supply funding program has been established to assist publicly owned water utilities in upgrading their systems to keep pace with expansion needs. Direction for the program is based upon State Board of Health public water supply regulations and Referendum 27.

Referendum 27 is a portion of the Washington Future Program approved by Washington voters in November, 1972. It provides a total of $75 million to be spent on municipal, industrial and agricultural water supply improvements through the year 1980. Through an inter-agency agreement, the Water Supply and Waste Section administers the municipal and industrial program ($50 million) and DOE administers the agricultural program ($25 million).

The following objectives have been identified for the public water supply funding program:

1) Ensure that the drinking water available to the citizens of Washington State is safe to drink.

2) Assist in development of water supply systems capable of providing all the water supply needs of a regional area in an efficient and reliable manner consistent with community goals.

In order to obtain grant and loan funding, a municipality must follow the detailed procedures outlined in the Referendum 27 Application and Funding Guidelines booklet which is available upon request from the Water Supply and Waste Section. The process generally includes three steps:

1) Preparation and submission of pre-application and application forms, along with necessary supplemental information;

2) Rating of the funding requests based upon established criteria, in order to determine priority.

3) Formulation of an offer and acceptance agreement between the State and municipality for those projects which ranked highest in the priority rating.

Loans are available for comprehensive water supply planning and preconstruction engineering activities, and grants are available for water supply facility construction. Loans may finance 100 percent of the planning and engineering stages of a project, while grants may finance 40 percent of eligible construction costs. Construction grants are generally available for water quality improvements, source development, water storage facilities, major transmission lines, pumping facilities, equipment and structures related to eligible projects, and site purchase and preparation.

As of April, 1974, 291 applications representing over $124,000,000 of construction had been filed with the Water Supply and Waste Section. Of those, 95 have received over $5,000,000 of Referendum 27 funds.

Approximately two-thirds of the funding requests have been for construction grants and one-third for comprehensive planning and preconstruction engineering activities.

The Referendum 27 water supply funding program has proven to be very responsive to the needs of public water utilities. Prior to availability of Referendum 27 funds, an evaluation of State water systems concluded that more complex and costly facilities would be needed in order to guarantee good quality water in sufficient quantity to meet the needs of

the State's increasing population. Many smaller water utilities did not possess the financial ability to meet the new State Board of Health requirements for public water systems, yet they were the only source of available water. Judging from the number of projects which require financial assistance and the kinds of improvements they represent, Referendum 27 funding has stimulated both small and large municipal water utilities to upgrade their systems.

Many of the municipalities which applied for funding have concentrated their past efforts in developing public sewage disposal systems. Therefore, a backlog of water supply improvement projects has accrued. With the continuation of the Referendum 27 public water supply funding program, it is hoped that all municipal water systems in Washington will be able to meet quality, reliability, and operation efficiency standards while planning for their future growth and coordinating with neighboring systems on an areawide basis.

The water supply program of DSHS is carried out through its headquarters in Olympia and regional offices in Seattle and Spokane. A total of 29 professional and technical personnel are involved in the water supply program, with the majority of positions filled by sanitary engineers. Table X shows the distribution of staff among the existing position titles.

TABLE X

WASHINGTON DEPARTMENT OF SOCIAL AND HEALTH SERVICES
Water Supply Program
Current (1976) Staffing Level

Position	1976
Engineer	20
Scientist	5
Technician	1
Other	3
TOTAL	29

The engineers listed above are sanitary engineers. Environmentalists comprise the category of "Scientist" and the category of "Other" includes various classes of personnel degreed in planning.

Because Washington has yet to establish a mandatory certification program and has only a voluntary certification process, the number of operators holding certificates is fewer than if certification were mandatory. Mandatory certification is anticipated within the next two years. Statewide, there are a total of 1,250 operators who have been certified in accordance with the Association of Boards of Certification Standards. Table XI illustrates the distribution of certified treatment plant operators by operator classification (Class IV requires the highest levels of training and experience).

TABLE XI

WASHINGTON CERTIFIED WATER TREATMENT SYSTEM OPERATORS
Current (1976) Staffing Level (est.)

Classification	1976
I	838
II	364
III	33
IV	15
TOTAL	1,250

Operators currently receive certification under guidelines established by the Pacific Northwest Section of the American Water Works Association booklet Voluntary Certification Program for Water Works Operators in the State of Washington. These regulations define training and experience requirements for certification of water distribution and water treatment personnel.

Information concerning DOE's involvement in water programs was obtained through telephone interviews with professionals in the Department's Office of Water Programs. Of particular assistance was Mr. Glen Fiedler, Director of the Water Quality Management Division.

It has been estimated that nine professionals contribute their efforts full-time to water supply activity. These positions include geologists, hydrologists, and civil engineers.

Sources at DSHS estimate there are an additional 30 professionals working in water supply through the county health departments. This workforce consists primarily of personnel degreed in sanitary engineering.

In total, there are approximately 1,400 persons in the State of Washington working in the field of water supply, combining both public and private sectors.

C. Workforce Projections

Although staff increases have been necessary recently with the assumption of primacy under the Safe Drinking Water Act, DSHS officials have indicated that a small decrease in workforce will occur over the next five years. Specific positions projected to be affected by this decrease are listed in Table XII.

TABLE XII

WASHINGTON DEPARTMENT OF SOCIAL AND HEALTH SERVICES
Water Supply Program
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum decline (average)
Engineer	20	20	19	18	18	17	10%	5%
Scientist	5	5	5	5	4	4	n/a	4%
Technician	1	1	1	1	1	1	n/a	0%
Other	3	2	2	2	2	2	n/a	7%
TOTAL	29	28	27	26	25	24		4%

The decrease depicted in Table XII will primarily be the result of attrition, rather than personnel actually being laid-off. These decreases are the result of a lessening workload and budgetary constrictions.

The turnover rate of 10 percent per annum for engineers is not abnormally high, as in most cases, a small percentage of entry level engineers gain experience at the state level and find more lucrative employment in the private sector.

DSHS sources indicate that more stringent enforcement of existing state regulations combined with the requirements of the Safe Drinking Water Act will necessitate an increase in the number of certified water treatment plant operators over the next five years. It has been estimated that an additional 300 operators will be added in the next five years. Workforce projections are in Table XIII.

TABLE XIII

STATE OF WASHINGTON

Water Treatment Plant Operators
Workforce Projections to 1982 (est.)

Class	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
I	838	875	895	920	940	950	15%	2%
II	364	390	430	480	500	530	10%	8%
III	33	38	42	45	47	50	5%	9%
IV	15	16	17	18	19	20	5%	6%
TOTAL	1250	1319	1384	1463	1506	1550		4%

It has been suggested by professionals in the field that operator certification promotes an upward mobility career attitude in most operators. Moreover, turnover rates diminish as certification levels increase.

DOE sources have indicated that their potable water workforce will remain constant over the next five years. This projection is based on the contention that there will be no major change in the present workload and recognition of the financial restrictions currently being imposed on all state agencies.

D. Training and Certification

For several years, separate specialized training programs were developed by municipalities, state agencies, and private interest groups. Material developed ranged from good to poor and the value of the courses to the operators was limited. Consistency and courses designed to specifically meet the need were seldom available.

During recent years, the American Water Works Association, the Water Pollution Control Federation, the EPA, and selected universities developed excellent training material and provided support, both financial and staff, to the promotion of better training programs nationwide.

With this diversity of ideas and programs, and with the guidance of a report on developing training programs[1], Washington has developed a systematic approach to its water and waste water training program. The material contained in this section is, in large part, from this report.

Identification of training needs is based upon "needed skills" and not desired skills. This is accomplished be reviewing the tasks an operator must do to perform the job satisfactorily.

The identification of the primary skills or knowledge needed serves as an outline to develop a system. Figure 5, The Training Matrix, provides a series of recommended areas of skill or competency for the various position levels or grades established by the certification programs.

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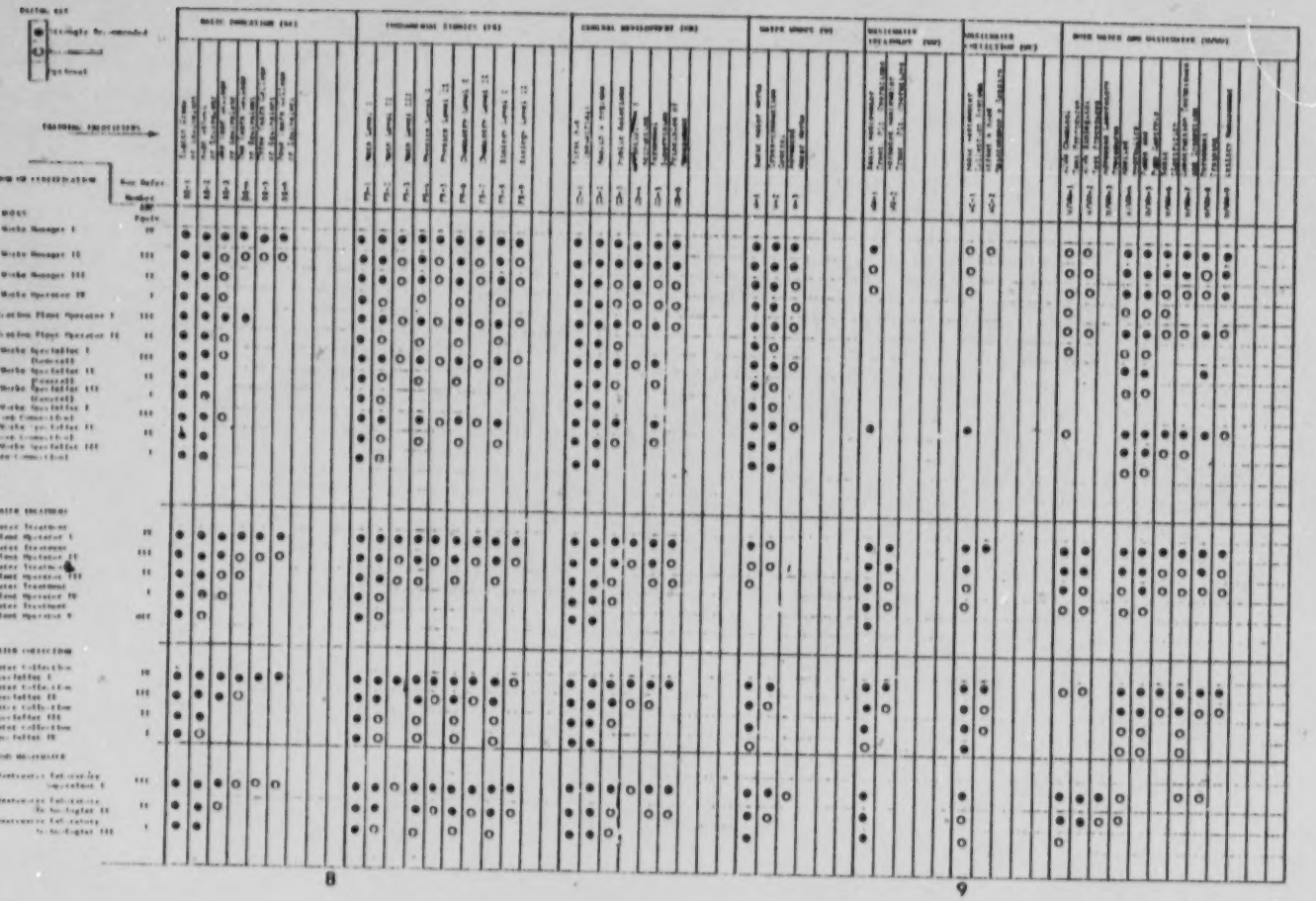
[1]Project Report by the Association of Boards of Certification for Operating Personnel in Water and Wastewater Utilities, Roles and Responsibilities for Developing A Comprehensive State Water and Wastewater Operator Training Program (Ames, Iowa: Association of Boards of Certification, 1976)

Figure 5



The Matrix is the framework for the training program in Washington to meet the "needed skills". It also serves as the framework to develop certification exams to measure the knowledge of the operator and to identify what categorical training the operator needs to meet the job demands.

The Matrix identifies many potential areas of training need. Historically, continuing education programs have attempted to "cover the essential" in a generalized training session. The recommended training program identifies modules or skill packages that cover a specific subject in detail. A building block approach is then used to add a module or skill package to the "needed training program" for an operator or group of operators.

Accepting the Matrix as the basis for developing training or skill packages, the next step was the delivery system. After skill packages were developed, i.e. Basic Water Works, Basic Waste Water, Applied Hydraulics, Pumps and Pump Controls, it was then necessary to determine which of the packages the operator would need to perform the job and how to present that program so the operator could make miximum use of it.

Once the skill packages were identified and developed, the method in which they are offered varies depending upon the need. However, it is the method of delivery which dictates how the training program must be developed and presented.

Preparatory programs of one to two years are an ideal approach to meet the demand for skilled new entries. The preparatory training in

Washington is centered at Green River Community College, Auburn, where a two-year Associate in Applied Science degree and a one-year Vocational Training Certificate is offered. The courses of this vocational program are directed to the actual operation and maintenance of the systems and system components as well as to the mathematical, physical, mechanical, chemical, bacteriological and biological fundamentals that govern the efficiency of each system component. The complex interrelationships between water supply, waste water disposal systems and other aspects of overall environmental quality are considered as are the complexities of managing people, funds, records, and reports. Classroom and laboratory training are supplemented by selected field trips and inspection and, to the extent possible, by summer internships. Upgrade or maintenance training is another major need of the water treatment plant operator training program.

This training is carried out primarily through the state's 26 community colleges. The State coordinator for Water and Waste Water Training works with the vocational-technical directors at each community college to schedule requested courses. The process works as follows:

> A request is received at the Coordinator's office for a specific course or interest area. The number of interested persons is estimated, an instructor is selected, and the course is set up as an 11-week evening class, meeting once a week for three hours. A course outline, manual, syllabus and instructors names are requested by the community college. The college schedules the course and publicizes it in quarterly schedules and catalogs. This method of instruction is an important part of Washington's training of water and waste water personnel. It is convenient for the employees and is an effective training delivery method. Examples of courses scheduled

through this system are: Basic Water, Applied Hydraulics, Pumps and Pump Controls, Physics and Mechanics, Fundamentals of Science, and Water/Waste Water Chemistry.

In 1976, four educational systems were used for the training of water supply personnel. The following table lists these systems and the number of participants.

TABLE XIV

STATE OF WASHINGTON

Water Supply Training Systems
and Participants Involved (1976)

Systems	Number of Courses	Number of Students
Preparatory Courses	1	15
Continuing Education		
A. Basic	18	360
B. Advanced	3	60
Seminars	5	250
Correspondence Courses	n/a	55

Some examples of the seminar topics are: Waste Water Treatment Laboratory (2-day), Millipore (2-day), Cross Connection (4-day). This training method provides a valuable concentrated instructional package.

The problem of personnel unable to attend either type of training because of travel and/or expense constraints has been approached with an on-site training program. Washington is filling this gap with correspondence courses: Ken Kerri from Sacramento State and the Clemson Courses from South Carolina University. Both courses are available through the Washington Operator's Resource Center, State Coordinator's Office, Green River Community College.

E. Career Potential

Since there is no growth expected at the professional level in Washington's water supply program, career opportunities here will be extremely limited. There may be future opportunities for chemists and laboratory technicians because of the increased bacteriological and chemical sampling required by the Safe Drinking Act.

Certified water treatment plant operators will be needed to bring about proper and effective use of existing treatment facilities to meet with more stringent enforcement of regulations.

DSHS sources have indicated that municipalities may well be in need of planning and management personnel in response to increased water supply activities.

F. Conclusion

The foregoing suggests that planning, management, and communication between federal, state, and municipal water quality personnel has produced a well-rounded, operational water supply program in Washington. If there is any major workforce problem that can be identified, that would be a lack of qualified water treatment operators. This problem causes the inadequate operations of treatment facilities which in turn cause a threat to public health. DSHS has worked long and hard to develop training programs at community colleges and on-site training facilities to provide for upgrade training.

These efforts will have little impact on treatment plant efficiency if legislation concerning mandatory certification of treatment plant operators continues to fail.

V. RADIATION

A. Introduction

Regulatory responsibility for radiation control is vested in the Washington State Department of Social and Health Services. The responsibilities of the Department are to license, register, advise and regulate all persons using radiation, radiation emitting machines, and radioactive materials. Further, the Department is responsible for ensuring the maximum protection to the public health and the maximum safety to all persons at or in the vicinity of places of use, storage, or disposal of radioactive materials.

B. Workforce Profile

Data from the workforce profile and projections were collected through on-site and telephone interviews with professionals in the field. Of particular assistance was Mr. Robert Wills of DSHS, Radiation Control.

DSHS has a professional staff of 8 to facilitate conducting all regulatory activites. The staffing of DSHS Radiation Section, by position, is in Table XV.

TABLE XV

DEPARTMENT OF SOCIAL AND HEALTH SERVICES
Radiation Section
Current (1976) Staffing Level

Position	1976
Physicist	5
Technician	1
Other	2
TOTAL	8

The personnel listed as physicists are degreed health physicists with extensive medical training. The technician holds the position of radiation control technologist and has had extensive training in radiation technology. The category "Other" includes a pharmacist and an engineer.

Comprehensive information regarding private sector workforce activity was not available. However, according to estimates provided by the Energy Research and Development Administration (ERDA) Publication #78 entitled An Analysis of Nuclear Related Technician Manpower in Western States, there were 134 radiation control technicians working in Washington as of January 1, 1975. A radiation control technician is defined in the ERDA study as one who monitors personnel, plant facilities, work environment, and plant vicinity to detect and control radioactivity and/or radiation exposure and performs operation, analysis, and calibration of radiation monitoring equipment.

C. Workforce Projections

Sources in the field have indicated that no increase in the DSHS workforce will occur over the next five years. This is primarily due to the limited amount of funds available for staffing positions and the no growth policy of state government existing at this time.

Although no increase in staff is expected, sources have indicated that the workload will continue to increase as licensing and registration activities involve an ever growing number of facilities. Professional workforce turnover rates are extremely low, approximately 1% per annum. This is the result of comparable salaries at the state level in relation to private sector salaries.

The previously cited ERDA publication reports that 71 additional radiation control technicians will be needed by 1977. Of these positions, 43 will represent the replacement of turnover, while only 28 new positions will be generated. The report also indicates that both radiation control and monitoring technician positions show an increasing amount of excess demand (inadequate supply) projected for the three year forecast, resulting in a projected 33 percent shortage for 1977. It should be noted that a large number of radiation control technicians in Washington can be attributed to ERDA activity in Richland at the Hanford Project.

D. Training and Certification

DSHS employees receive training through ERDA seminars and courses offered by the Nuclear Regulatory Commission. Communication among professional staff members provides for a continuous exchange of state of the art knowledge and for new personnel represents on-the-job training potential.

Training is available through various Washington universities for professional positions in radiation and through the community college system for technician level positions.

E. Career Potential

As our dependence on nuclear power production increases, and research and development activity expands, many good career opportunities will be developed. Sources in the field have indicated that job opportunities will exist in abundance for highly trained engineers and health physicists as well as for technicians, maintenance, and labor personnel.

F. Conclusion

Because radiation technology is a relatively new field, and because extensive training is important in this area, there now exists an excess demand for qualified personnel. With the increasing use of nuclear power for electrical generation, the by-product, nuclear waste, has become a major concern to public health officials. The proper handling, transportation, and storage of this waste will require extensive planning in the beginning and equally diligent monitoring during and after storage has been accomplished. All of these activities will provide career opportunities in the future.

VI. SOLID WASTE

A. Introduction

Solid waste management activity in Washington includes operating and financing solid waste programs, developing acceptable methods of reducing the amount of solid waste and unsalvageable waste materials, developing and applying new and improved methods collecting and disposing of solid waste, processing and recovering materials and energy from solid waste, and identifying of solid waste components and potential materials and energy recoverable from such waste components.

According to the Department of Ecology's solid waste management plan, if solid waste is to move out of a poor third place and enjoy a higher status among environmental considerations, an intensive and sustained program of information and education must be commenced.

The Department has suggested that one of the major problems of establishing and implementing solid waste management programs is the lack of public awareness, and subsequent apathy, regarding solid waste problems. Although there has generally been a great increase in interest on behalf of the public regarding other environmental issues, there still remains a general lack of knowledge of the detrimental effects of solid waste on the environment and the need for improved programs to deal with solid waste management problems.

Little is known, relatively speaking, about the extent of the solid waste problem and management techniques, as compared to the many other

environmental problems which confront officials with public responsibilities. Not only is the general lack of knowledge and apathy present throughout the public sector, often it is also evident among the personnel engaged in the operations of the solid waste management.

In response to this apparent need, the Department has begun to establish and develop a solid waste training program within the State Solid Waste Management Program which will consist of training courses, information-education presentations and disseminate information on all aspects of solid waste to the local communities.

An especially innovative concept has been developed through the passage of the Model Litter Control Act of 1971. This Act was developed after recognizing the rapid population growth of the State and the ever increasing mobility of its people, the fundamental need for a healthful, clean, and beautiful environment and recognizing that the proliferation and accumulation of litter discarded throughout the state impairs this need and constitutes a public health hazard, and further recognizing that there is an imperative need to anticipate, plan for, and accomplish effective litter control.

Authority was delegated to DOE to conduct a permanent and continuous program to control and remove litter to the maximum practical extent possible. The functions assigned to DOE are as follows.

1) Serve as the coordinating agency between the various industry organizations seeking to aid in the anti-litter effort;

2) Recommend to the governing bodies of all local governments that they adopt ordinances similar to the provisions of the Act.

3) Cooperate with all local governments to accomplish coordination of local anti-litter efforts;

4) Encourage, organize, and coordinate all voluntary local anti-litter campaigns seeking to focus the attention of the public on the programs of this state to control and remove litter;

5) Investigate the availability of, and apply for funds available from any private or public source to be used in the program of litter control.

The various solid waste disposal sites are listed in table XVI below.

TABLE XVI

WASHINGTON DISPOSAL SITES
As of 5/6/76

Type	Number
Modified Landfill	31
Demolition Waste	3
Modified Landfill Industrial	2
Modified Landfill Wood Waste	25
Open Dump	174
Open Dump Demolition	11
Open Dump Industrial	5
Open Dump Wood Waste	45
Promiscuous Dump	90
Resource Recovery	5
Sanitary Landfill	25
Transfer Station	14
TOTAL	430

It is interesting to note that of the 430 sites only 25 are sanitary landfills, while the promiscuous dumps and open dumps comprise more than 75% of the facilities. These figures above suggest a real need for solid waste management and planning in Washington.

Solid waste producers involving Washington industries have been identified by Standard Industries Classification codes in a study entitled A Report on Industrial and Hazardous Wastes developed by DOE in 1974. Table XVII lists, by industry, total number of employees and total volume of solid waste per month. It should be pointed out that the following represents the outcome of a study which is unique to the Region X states.

TABLE XVII

STATE OF WASHINGTON
Industrial Employment and Solid Waste Volume
1976

Industry	Employment	Solid Waste Volume (tons per month)
Petroleum Refining and Related Indus.	1,700	1,000
Stone, Clay, Glass, and Concrete Prod.	3,600	11,000
Primary Metal Industries	n/a	48,000
Fabricated Metal Products, except machinery and transportation	600	90
Paper and Allied Products	12,000	26,800
Printing and Publishing	7,000	1,056
Chemicals and Allied Products	2,855	27,000
Food and Related Products	n/a	95,000
Textile Mill Products	763	23
Lumber and Wood Products, except furniture	38,000	600,000

B. Workforce Profile

Information for this section has been obtained through on-site and telephone interviews with personnel at the Department of Ecology. Valuable assistance was provided by Mr. Avery Wells and Mr. Earl Tower, both of DOE Solid Waste/Resource Recovery Division.

The DOE Solid Waste/Resource Recovery Division has been assigned primary responsibility for the control and abatement of solid waste pollution.

This division maintains a total staff of 25 professionals who perform a variety of functions as listed below.

1) Development and revision of state laws and regulations;
2) Policy and procedure recommendations;
3) Development of forms, guidelines;
4) Development of monitoring programs and maintenance of statewide data;
5) Technical assistance for statewide matters and assistance requested by regions and other departmental units;
6) Special projects and studies of statewide significance;
7) Information services to public, local government, other state agencies, federal government, etc.;
8) Grant program develop and administration;
9) Liaison with federal and state agencies, legislature, local government, citizen groups, etc., having statewide impact;
10) Budget proposals, future goal and objective development;
11) Priority development within program;
12) Status and accomplishment, evaluation and audit.

These various functions are carried out by the following sections of Solid Waste Planning, Solid Waste Program Development and Management, Solid Waste Engineering and Construction, and the Litter Control section.

The programs carried out by the Division include the following major categories.

1) Coordination of Total Program
2) Residential Wastes
3) Commercial Wastes
4) Industrial Wastes
5) Hazardous Wastes
   a) Chemicals
   b) Hospital Wastes

c) Radioactive
d) Explosives

6) Resource Recovery
   a) Recycling
   b) Reclamation
   c) Energy Conversion
   d) Source Reduction
   e) Marketing

7) Agriculture
   a) Animal Wastes
   b) Field Residues
   c) Crop Processing

8) Logging and Wood Wastes

9) Mining Wastes

10) Governmental Facilities

11) Abandoned Autos

12) Demolition Wastes

13) Litter

14) Waste Water Treatment Residues

15) Air Control Treatment Residues

A number of activities are carried out for each of the above categories. They consist of the following:

1) Management System for Each

2) Storage

3) Collection
   a) Drop-off Box System
   b) Transfer Station

4) Transportation (Truck, Rail, Barge)

5) Resource Recovery

6) Disposal (One or more of following)
   a) Landfill
   b) Incineration
   c) Composting
   d) Reclamation
   e) Energy Conversion

7) Implementation Schedules (Manpower, Dollars)

8) Legislative Authorities

9) Regulatory Authority, etc.

10) Financial Systems

11) Public Information

12) Training

13) Enforcement Program

14) Technical Assistance

15) Liaison/Coord. w/other Programs

16) Surveillance and Monitoring

17) Status and Accomplishment

18) Evaluation System

The current staffing level of DOE, Solid Waste and Resource Recovery, is provided by professional discipline in Table XVIII.

TABLE XVIII

DEPARTMENT OF ECOLOGY
Solid Waste and Resource Recovery
Current (1976) Staffing Level

Position	1976
Engineer	6
Sanitarian	6
Scientist	4
Other	9
TOTAL	25

Personnel listed in the position of "Scientist" are primarily environmental specialists with educational backgrounds in the biological and chemical sciences. The "Other" category includes professionals working as public relations specialists under the Model Litter Control Act. These poeple have a variety of educational backgrounds ranging from journalism to business administration.

Private sector disposal workforce activity has been estimated to involve some 300 people. This workforce includes landfill owner/operators, heavy equipment operators, and weighmasters. Table XIX identifies the private sector workforce by position title.

TABLE XIX

PRIVATE SECTOR
Solid Waste
Current (1976) Staffing Level (est.)

Position	1976
Landfill Owner/Operator	140
Heavy Equipment Operator	150
Weighmaster	10
TOTAL	300

This workforce is primarily maintained by the municipalities.

The personnel listed in the position of "Landfill Owner/Operator" may perform a wide variety of functions, including site operation, traffic control, waste identification, and in some instances, resource recovery activity.

The private sector workforce profile involving waste collection personnel has been estimated to include some 1,200 people. These collection service personnel work under a franchise system and provide collection services to specific population centers. Personnel in this workforce include drivers, jumpers, and occasionally, heavy equipment operators.

C. Workforce Projections

It has been suggested by professionals in the field that, as a result of the increasing responsibilities mandated by the Resource Conservation and Recovery Act of 1976 (RCRA), a probable increase of 5 staff members would occur over the next five years. These positions would be primarily in the areas of planning and management of solid waste systems. Table XX illustrates this increase within specific position areas.

TABLE XX

DEPARTMENT OF ECOLOGY
Solid Waste and Resource Recovery
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	6	6	6	7	7	8	n/a	6%
Sanitarian	6	6	6	6	6	6	n/a	0
Scientist	4	4	5	5	6	6	n/a	9%
Other	9	9	9	10	10	10	n/a	2%
TOTAL	25	25	25	28	29	30		4%

In the preceding Table, growth in the position "Scientist" is based on the assumption that RCRA efforts will necessitate in-depth research and planning activities. Growth in the "Other" category is expected to include public relations personnel. Engineers will be needed to develop systems providing for hazardous waste management and resource recovery capabilities.

Turnover rates are not included in this table because too little turnover has occurred in this area to provide an accurate estimate.

Department professionals have indicated that a major increase in disposal personnel will occur as a result of the additional services provided by landfill operators in response to the Toxic Substances Act and the RCRA of 1976. Specific responsibilities to support these acts are still in the developmental stages. It has been suggested that a doubling of staff will be required in the next five years for adequate disposal of the increasing volume of solid waste created by an ever-growing population.

TABLE XXI

STATE OF WASHINGTON

Private Sector Solid Waste Personnel
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Landfill Owner/ Operator	140	185	2[illegible]0	290	325	355	16%	21%
Heavy Equip. Operator	150	175	195	205	210	225	7%	9%
Weighmaster	10	12	14	16	18	20	13%	15%
TOTAL	300	372	439	511	553	600		15%

It should be noted that the dramatic increase in landfill owner/operator personnel will be the result of adding additional personnel at existing sites and does not represent a major change in the actual number of sites.

Department staff have suggested that a 10% per annum growth in collection personnel will be realized throughout the next five years. This growth will be spread out over all positions operating in that profession and will be the result of increased service to rural areas.

D. Training and Certification

As the present time certification of landfill personnel is not required by any state or municipal concern, but in the future, handling of hazardous wastes is anticipated to create a need for some form of competency evaluation. Workforce training will be done for the most part on-site by specialists who have received training through community college and vocational/technical programs.

E. Career Potential

In view of the fact that workforce increases are expected to be limited to labor-oriented positions, little career potential for degreed engineers, geologists, and hydrologists is expected.

Although resource recovery is not a highly developed program at the present time, in the future, highly trained engineers and scientists will be required for planning, design, and operation of resource recovery facilities.

F. Conclusion

While more stringent enforcement of regulations and development of hazardous waste control guidelines dominates management activity, the physical aspect of collection and disposal will provide the greatest number of job opportunities. The training of landfill operators will best be accomplished through EPA sponsored short courses on-site or offered at easily accessible locations in seminar form as cost constraints continue to restrict rural municipal training efforts. Planning and implementation of the Resource Conservation and Recovery Act of 1976 will have a significant impact on the solid waste field. Particular areas of emphasis will include engineering, systems design, operations management and planning more sophisticated and complex methodologies for disposal of all waste is certain to emerge. Concordant with these activities, resource recovery and energy conversion activities will also influence job opportunities. Throughout the field more individuals will be needed with defined technical and academic skills in the sciences, management, and engineering disciplines.

VII. WASTE WATER

A. Introduction

It seems appropriate to introduce Washington's waste water section by reviewing what has been called one of the most outstanding pollution success stories in the nation by the Council on Environmental Quality back in 1971.

This story hinges on the effective use of citizen involvement and the legislative creation of a multi-city municipality. The Municipality of Metropolitan Seattle (METRO) was approved in 1958 after citizen speakers gave over 300 lectures, 5,000 men, women, and children rang doorbells, and endorsements were obtained from more than 200 civic, community, and professional organizations. This municipality was created in an effort to provide a centralized planning and management facility with the primary function of establishing and maintaining a comprehensive sewer system designed to eliminate the disposal of raw sewage into Lake Washington, which had become polluted beyond public use. The effect of this effort can be seen in the clean waters of Lake Washington and the elaborate system which serves over 900,000 people living in a 300 square-mile area.

Since its conception, METRO, with the financial assistance of EPA, has developed a computer-augmented treatment and disposal (CATAD) system. This system had four primary benefits:

1) Overflows of combined sewage into Lake Washington, Puget Sound, and the Duwamish River can be minimized.

2) When overflows must occur, the computer, equipped with information about the conditions in the receiving waters, can select the points of overflow which will inflict the least impact on those waters.

3) As sewer separation is undertaken, it need not be completed immediately due to the CATAD system. Therefore, costs can be spread over a longer period.

4) The effective dry weather capacity of METRO's system can be increased by lessening the effect of normal "peaks" in the flows through the system and thus future capital requirements for treatment plants can be delayed or eliminated.

Because METRO was conceived by environmentalists, elected officials and citizens who served on the Metropolitan Council, they have been guided by environmental concerns in formulating the agency's policies. Innovation and research are integral parts of the METRO program. New techniques constantly are being researched and tested to assist METRO in its primary responsibility: protection of the waters that surround metropolitan Seattle from pollution and contamination.

This approach is applied to every aspect of its operations. Recycled water is used for plant washdown and ground keeping. Methane gas, a by-product of the sludge digestion process, is used for fuel in some parts of the system. In construction of its interceptor network, new safety procedures were designed for the complicated tunneling where compressed air work was required. Marine life studies and water quality monitoring are ongoing parts of its research program.

In addition to the centralized efforts of METRO, the Department of Ecology has been designated by state law RCW 90.48.260 as the state water

pollution control agency. The responsibilities delegated to DOE are as follows:

1) To establish and administer a comprehensive state point-source waste discharge or pollution discharge elimination permit program.

2) To establish and administer state programs in a manner which will insure the procurement of moneys, whether in the form of grants, loans, or otherwise; to assist in the construction, operation and maintenance of various water pollution control facilities.

3) To develop and implement appropriate programs pertaining to continuing planning processes, areawide waste treatment management plans, and basin planning.

B. Workforce Profile

Information for the workforce profile was obtained through on-site and telephone interviews with personnel from the DOE, Office of Water Programs. Of particular assistance in the collection and compilation of this information was Mr. Glen Fiedler, Water Quality Management Division.

As the regulatory body for waste water pollution control, DOE, Office of Water Programs conducts activities involving a professional workforce of 53 persons. These activities include compliance monitoring surveys, water quality assessments, treatment plant efficiency studies, waste water discharger inventories, NPDES program administration, waste water grants and loan administration, and rules and regulation development. These activities are carried out through the headquarters office in Olympia and three field offices.

Table XXI illustrates the distribution of personnel by profession.

TABLE XXII

WASHINGTON DEPARTMENT OF ECOLOGY
Office of Water Programs
Waste Water Pollution Control Personnel
Current (1976) Staffing Level

Position	1976
Engineer	26
Technician	11
Scientist	9
Other	7
TOTAL	53

The engineers, which make up over half of the entire workforce, hold degrees in chemical, sanitary, mechanical, and civil engineering. Personnel listed as technicians are primarily environmental technicians with biological and chemical science-oriented educational backgrounds. The scientists listed above hold degrees in environmental science and environmental planning with some specialities in economics. The position "Other" contains two administrators, three inspectors, and two part-time attorneys.

Construction of wastewater treatment facilities has provided extensive job opportunities for plant operators over the past five years. In 1973 Washington passed an act which required all wastewater treatment plant operators in responsible charge of treatment facilities to be certified in a class equal to or higher than the class of the facility. As a result of the mandatory certification, 1,206 treatment plant operators have been certified

Table XXIII illustrates the distribution of certified treatment plant operators by operator classification.

TABLE XXIII

STATE OF WASHINGTON

Certified Waste Water Treatment Plant Operators
Current (1976) Staffing Level

Classification	1976
I	14
II	112
III	289
IV	449
V	257
Provisional	85
TOTAL	1,206

As of July 30, 1976, DOE sources estimated that a total of 1,391 people were employed by municipalities in waste water treatment facilities. Of this total, 1,266 were plant operators and 125 were related personnel, such as lab technicians, engineers, electricians, and maintenance occupations.

C. Workforce Projections

The Department of Ecology officials have indicated that little staffing growth will occur over the next five years due to departmental financial limitations and upper level governmental policy. This is not to say that the workload will remain static or that additional workforce resources are not needed, but because of the recent state election, priority area decisions and program efficiency evaluations have curtailed staff growth.

The following workforce projections for treatment plant operators are based on past employment records provided by the Department of Ecology. During the past three years, an average of 175 waste water treatment plant operators have been hired each year. As a result of information provided by the NPDES Reports, and projections based on the State waste water treatment grants priority list for new projects, continuation of past employment trends is anticipated to provide jobs in this area for over 875 plant operators by 1982. Additional personnel required to implement state waste water treatment plans include lab technicians, engineers, and those in labor and maintenance-related jobs. Overall, these jobs will add an estimated 100 positions to the evergrowing waste water workforce.

Table XXIV provides a breakdown of the workforce growth by certification level.

TABLE XXIV

STATE OF WASHINGTON

Certified Waste Water Treatment Plant Operators
Workforce Projections to 1982 (est.)

Classification	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
I	14	18	22	26	28	30		15%
II	112	130	145	160	180	210		13%
III	289	360	400	445	500	560		14%
IV	449	530	580	615	680	735		10%
V	257	310	365	380	400	461		13%
Provisional	85	85	85	85	85	85		n/a
TOTAL	1,206	1,433	1,597	1,711	1,873	2,081		12%

It should be noted that provisional certificates are those which were offered without examination to personnel operating treatment plants on or before July 1, 1973. No additional certification of this type will be available in the future.

As indicated by the table preceding, turnover rates are proportionate to certification levels. As personnel become certified at higher levels, they not only find salary increases, but attain a greater sense of professionalism which promotes job security.

D. Training and Certification

The operation of training programs designed to facilitate and promote operator certification dominates training activity in this area. Specific classification requirements for the various certification levels are as follows:

All applicants must satisfactorily pass the examination given by the board.

Group I

a. Education: Four years of college or university credit in sanitary, chemical, civil, electric, or mechanical engineering or equivalent, or combination of formal college education and training credits to equal four years education. (see "Equivalent Experience" below)
b. Experience: Six years of acceptable operation of a sewage treatment works, four years of which must represent time in responsible charge or equivalent.

Group II

a. Education: One year of college or university credit in engineering or equivalent.
b. Experience: Four years of acceptable operation of sewage treatment works, two years of which must represent time in responsible charge or equivalent.

Group III
a. Education: High school diploma or equivalent.
b. Experience: Three years of acceptable operation of a sewage treatment works or equivalent.

Group IV
a. Education: Two years of high school or equivalent.
b. Experience: One year of acceptable operation of a sewage treatment works or equivalent.

Group V
a. Education: Eighth grade
b. Experience: Six months of acceptable operation of a sewage treatment works, or have completed 36 class hours of instruction for sewage works operation.

Equivalent Education
a. Subject to the discretion of the Board, operating experience may be substitued up to a maximum of three years of high school.
b. One year of college credit shall mean 30 semester hours or 45 quarter hours.

Provisional
A "Grandfather Clause": Before the current certification program came into being, operators were certified at their existing job level and location. The certification was valid only under those conditions and upgrading or transfer to another plant required recertification under the new program.

The training and certification needs of waste water personnel are coordinated statewide through the Washington State Coordinator for Water and Waste Water Training. The training facilities currently available include:

1) One full-time degree program at Green River Community College, Auburn.

2) Twenty-one occasional courses through the continuing education office of the various other community colleges throughout the state.

In 1976, 712 individuals attended waste water training sessions. The specific type of training and number of students involved is listed below:

Waste Water Training Activities (1976)

Course Type	Number of Courses Offered	Number of Students Attending
Preparatory 2-year Degree	1	15
Continuing Education		
Basic	18	360
Advanced	3	60
Seminars	5	250
Correspondence Courses	2	27
TOTAL	29	712

Additional training opportunities are expected to be available in the future with the funding support of EPA and DOE providing for development of a large waste water training facility. No information on the construction date or location is available at this time.

Along with developing and publicizing training activities, another function of the water/waste water coordinator's office is to compile transcripts listing continuing education units acquired through participation in qualified training programs. This transcipt provides information for future employment and present employee accomplishments.

As of July 30, 1976, the training facilities available in Washington have provided enough effective training to meet certification requirements for 80% of the waste water operators, this representing the training of 1,121 treatment plant operators.

E. Career Potential

Since there is no growth to be expected in the workforce employed in the state agency waste water pollution control program, career opportunities there will be extremely limited. Only turnover will be replaced and turnover is likely to remain quite low.

Because of continued construction of new facilities and the modification of existing treatment facilities, job opportunities will be substantial in the area for plant operators. Occupational upward mobility has been made available through the certification program which has provided a greater sense of professionalism to the operators in the field.

F. Conclusion

After reviewing the information, it is obvious that more stringent enforcement of existing legislation and technological advances in the field of waste water treatment are going to create many jobs for treatment plant personnel in the next five years. These positions will include plant operators, maintenance personnel, and a basic labor force. It has been suggested by sources in the field that the proper training and certification of operator personnel may increase the efficiency of a treatment plant by 50%. This would indicate that operator training in the future will become an important component in the effort to eliminate waste water pollution in Washington. Although current training activity is quite extensive, technological advances in treatment operations and the need for more advanced systems to promote energy recovery from sludge disposal is expected to create a need for continual upgrade training and additional activity in research and development.

VIII. ENERGY

A. Introduction

Much of the energy produced in Washington is of the hydroelectric form, which constitutes little danger to the environment in relation to coal, gas, or oil fired production systems.

As the population increases and new industrial concerns require more electrical energy, alternative forms of energy production will begin to emerge.

With energy shortages increasing, the State of Washington has developed the following policy:

1) The development and use of a diverse array of energy resources with emphasis on renewable energy resources shall be encouraged;

2) The development and use of energy resources shall be consistent with the statutory environmental policies of the state;

3) Energy conservation and elimination of wasteful and uneconomical uses of energy and materials be encouraged. This conservation should include, but not be limited to, resource recovery and materials recycling;

4) In energy emergency shortage situations, energy requirements to maintain the public health, safety, and welfare shall be given priority in the allocation of limited availability of energy in order to minimize adverse impacts on their physical, social and economic well-being; and,

5) State government shall provide a source of impartial and objective information in order that this energy policy may be enhanced.

In 1976, the Washington legislature created the "State Energy Office". That office was created as an agency of state government, responsible to the governor and the legislature for carrying out the following duties:

1) To establish and maintain a central repository in state government for collection of data on energy resources, including but not limited to:
   a) Data on energy supply, demand costs, projections, and forecasts;
   b) Inventory data on energy research projects in the state conducted under public and/or private auspices, and the result thereof;

2) To prepare analyses of such data as well as analyses of projections and/or forecasts of energy supply and demand in the state and region as are necessary for development of recommendations with respect to the timing of construction of additional facilities and other energy programs and the development of other information as is necessary to support the performance of its duties;

3) To carry our energy related administrative and program functions and activities established by federal law, regulations, or guidelines which are and which have previously been or may be determined to be suitable for implementation by the State of Washington;

4) To develop and disseminate guidelines for the development of conservation plans for use by government, industry, and individual citizens;

5) To prepare in conjunction with the energy advisory council, contingency plans for implementation by state government in the case of a clear and foreseeable danger of energy shortages or actual energy emergencies. Such plan shall include procedures for determining when such shortages or emergencies exist, the state officers, and agencies to participate in such determination, and actions to be taken by various agencies and officers of state government in order to reduce hardship and maintain the general welfare during such emergencies. The components of such plans that require legislation for their implementation shall be presented to the legislature in the form of proposed legislation at the earliest practicable date;

6) To advise and support agencies of state government whose plans and programs involve the production, conversion, transmission,

or end-use of significant amounts of energy, or which require knowledge of the present and projected supply and demand of energy, so that such agencies may evaluate the consequences of such actions with respect to state energy goals;

7) To advise and support the regulatory functions of state agencies through information, reports, and studies;

8) To present state interests and concerns on energy matters to local governments, other states, regional interstate energy organizations, federal agencies, and private interests, PROVIDED, That nothing in this subsection shall be construed to abrogate or diminish the function, powers, or duties of other state agencies established by law;

9) To present the state's interests in the field of nuclear energy to federal, regional, and local authorities and to private interests as an identifiable activity within its overall program;

10) To make periodic reports and policy and program recommendations to the governor and the legislature and to submit proposed legislation to the legislature;

11) To serve as the official state agency responsible for coordination of energy-related activites.

In addition to and in support of the State Energy Office, there has been created an Energy Advisory Council. The eleven members of this council carry out the following duties:

1) To advise, monitor and review the programs and policies of the state energy office and to provide direction and guidance for the activities of the state energy office; to approve by a majority vote all major programs and policies of the state energy office;

2) To act as a source of innovative ideas and policy approaches in energy matters;

3) To advise and make recommendations to the governor and the legislature on state energy policies, practices, programs, and legislation;

4) To make recommendations to the governor for appropriate emergency curtailment and/or allocation plans and procedures to be used in the event of an energy alert or energy emergency;

5) To advise the governor of the time or times, if any, based on pertinent information, when energy supply conditions require execution of energy alert or energy emergency curtailment and/or allocation procedures, and also the time or times when such procedures can prudently be terminated;

6) To monitor and review in conjunction with the state energy office, compliance with and effectiveness of orders of the governor issued under sections 18, 22, and 28 of this 1976 amendatory act; PROVIDED, That compliance by regulated distributors shall be reviewed by the Washington utilities and transportation commission and the results thereof shall be reported to the council;

7) To interpret and coordinate energy related functions and activities established under federal law, regulations, or guidelines which are assigned to or required to be performed by the state of Washington, or which are determined to be suitable for implementation by the state of Washington; PROVIDED, That the governor may designate, with approval of the energy advisory council, appropriate agencies of the state for implementation of all or parts of certain energy programs of the federal government where such designation is in the interest of efficiency, economy, or utilization of special expertise: PROVIDED FURTHER, That the energy advisory council shall advise such agencies and review the work performed pursuant to such designation by the governor: PROVIDED FURTHER, That nothing in this subsection shall be construed as limiting the authority of the governor over operations of state agencies;and

8) To exercise all other powers and perform all other duties now or hereafter provided by law.

B. Workforce Profile

Information for the workforce profile and projections was obtained through interviews with professionals in the Washington State Energy Office (WSEO) and through literature research.

The Washington State Energy Office has a current staff of 10 professionals who perform the various functions of the office. This staff includes (1) director, (1) administrator, (1) attorney, (1) public information officer, (1) engineer, (1) fuel allocations specialist, and (4) program personnel with liberal arts backgrounds.

C. Workforce Projections

Workforce projections in this area are dependent upon continued federal support in the form of direct funding.

If federal support continues, a workforce of 40 professionals may be developed by 1981. Sources in the field have indicated that the effects of the energy extension services concept, the weatherization program, and the RCRA of 1976 will all provide growth potential for their office programs and staff necessary to accomplish those programs.

Positions to be added will include engineers, public information specialists, nuclear specialists, administrators, and generalists with B.A./B.S. backgrounds.

D. Training and Certification

The WSEO offers assistance and information concerning energy conversion and conservation, but offers no specific training programs. Personnel training is developed primarily through structured university programs and experience in the field.

Sources indicate that energy seminars may be developed in the future to promote energy conservation in the public sector.

E. Career Potential

Career opportunities are expected to develop in this area for highly trained engineers, scientist, and architects. Vocational/technical personnel may find job opportunities in the areas of resource conversion, recycling, and conservation.

F. Conclusion

Although this area of activity is extremely dependent upon federal support at this time, all indications point to growth in energy-related fields. Highly trained specialists will be needed for the development and implementation of energy conversion and conservation plans. Although the Pacific Northwest enjoys an abundance of hydroelectric power, alternative energy sources are being developed in solar, nuclear and geothermal fields. Currently, Washington provides the most inexpensive electrical power service in the nation. This has attracted several power-consuming industries to the area. If sufficient energy is not made available through research and development of alternative sources which are environmentally safe, the increased cost of hydroelectric power may well cause industry to move out and economic disaster to move in.

Selected Post Secondary Institutions With Formal Environmental Energy Programs

Environmental education is offered through various educational disciplines in approximately 75% of the postsecondary institutions in Washington State. Although the majority of universities, community colleges, state colleges, and technical schools offer occasional courses in enviornmentally related fields, there are only three institutions offering programs large enough to impact the future workforce of the state.

The Washington State Council for Postsecondary Education identifies the following as institutions offering major programs in the environmental field: 1) University of Washington, Seattle; 2) Huxley College of Environmental Studies, Bellingham; and, 3) Evergreen State College, Olympia. Among these three schools exist three very different approaches to environmental education. The University of Washington offers numerous courses in a variety of disciplines under the traditional system of education within the University structure. Huxley College offers several concentrations aiming the student at a particular discipline within Huxley, which is a cluster college of Western Washington State College, and offers strictly environmental science courses. The third and most untraditional of the three institutions is Evergreen State College. It offers self-designed majors with emphasis on field work, rather than a pre-established, unflexible curricula. As programs offered change year to year, the courses offered may also undergo yearly changes or modifications.

Green River Community College in Auburn has an exemplary program in Water/Wastewater Operations. Both an A.A.S. degree and a Certificate are offered through the program.

The following section of this report provides an analysis of the environmental education programs available through Green River Community College and Huxley College of Environmental Studies. The program offerings available through Huxley which are being examined in this report are: Generalist, Environmental Planning, Human Ecology, Environmental Education, Environmental Administration, Environmental Systems and Simulations, Ecosystems Analysis, Environmental Health, Environmental Monitoring, and Marine Resources.

SENIOR INSTITUTIONS

Huxley College of Environmental Studies
Bellingham, Washington

Programs: Generalist (B.A.)
Environmental Planning (B.S.)
Human Ecology (B.S.)
Environmental Education (B.S.)
Environmental Administration (B.S.)
Environmental Systems and Simulations (B.S.)
Ecosystems Analysis (B.S.)
Environmental Health (B.S.)
Environmental Monitoring (B.S.)
Marine Resources (B.S.)

Hours required for major: Quarter -
Generalist - 68
Environmental Planning -69
Human Ecology - 69
Environmental Education - 83
Environmental Administration - 70
Environmental Systems and Simulations - 56
Ecosystems Analysis - 64
Environmental Health - 63
Environmental Monitoring - 64
Marine Resources - 72

Program Inception: 1970
Staff Size: Sixteen persons
Enrollment: 260
Graduates (1976): 77-100
Placement: not available
Graduate Work: not available

Courses

Challenge of Survival
Man and His Environment I, II
Man, Society, and Environment I, II
Introduction to Environmental Planning
Introduction to Systems Analysis
The Planning Process
Graphic Analysis and Presentation
Oceanography and Marine Resources
Marine Resources Laboratory
Marine Bioresources
Applied Ecology and Applied Ecology Laboratory
Population Dynamics I, II
Population Dynamics Laboratory I
Human Ecology
Introduction to Environmental Pollution

Food, Hunger, and Malnutrition
Water Pollution
Air Pollution
Quantitative Methods for Environmental Problems
Systems Energetics
Environmental Psychology
Education as an Environmental Process
Alternative Futures
Environmental Economics
Research Methods
Research Design
Seminar
Regional Environmental Planning
Urban Environmental Planning
Environmental Site Planning
Open Space Planning
Pollution and Marine Ecology
Techniques of Marine Analysis
Cultural Ecology
American Indian Environmental Concepts
Ecosystems Analysis and Modeling
Environmental Impact Studies
Nutritional Chemistry
Pollutants and Health
Pollution Analysis
Environmental Biochemistry
Internship in Environmental Health
Systems Analysis
Natural Systems Simulation
Environmental Ethics
Social Science as Environmental Education
The Environmental Education Curriculum
Internship in Environmental Education
Urban Economics
Law of the Sea
Law and Politics of the Environment
Resource Economics
Resource Management
Problem Series
Environmental Analysis for Land Use Planning

COMMUNITY COLLEGES/TECHNICAL INSTITUTIONS

Green River Community College
Auburn, Washington

Program: Water/Wastewater Operations (A.A.S., Certificate)

Hours required for major: Quarter - (A.A.S.) 45, (Certificate) 39.
Program Inception: 1974
Staff Size: One full-time instructor, supplemented with part-time instructors.
Enrollment: 30
Graduates (1976): 8
Placement: 100%

Courses

Fundamentals of Science Applicable to Water and Wastewater Utilities
Cross-Connection Control
Physics and Mechanics
Water/Wastewater Chemistry
Applied Hydraulics
Chemical Test Procedures
Aquatic Biology
Water Treatment
Biological Test Procedures
Wastewater Treatment
Collection-Distribution Systems
Advanced Treatment Operations
Advanced Laboratory Procedures
Utility Management
Water/Wastewater Work Study
Environmental Problems

State Legislation

WASHINGTON GENERAL

TITLE:

Department of Ecology Law
Washington Code 43.21A

PURPOSE:

To provide for a healthful and pleasant environment and to control the proper development and use of the state's natural resources, and to create a department of ecology.

DEFINITIONS:

1. Department
2. Director
3. Commission

ADMINISTERING AUTHORITY:

Department of Ecology
Ecological Commission

AUTHORIZATIONS:

To assume all powers authorized to the Water Pollution Control Commission;
To assume all powers authorized to the Department of Water Resources;
To assume all powers authorized to the Air Pollution Control Department;
To assume all powers authorized to the Department of Health involving the control of pollution problems;
To issue regulations pursuant to the act to carry out the purposes of the act;
To undertake a marine pollution and baseline study program;
To consult with other state agencies in formulating environmental policies.

WASHINGTON AIR

TITLE:

Clean Air Act
Washington Code 70.94

PURPOSE:

To provide for a coordinated statewide program of air pollution prevention and control.

DEFINITIONS:

1. Air contaminant
2. Air pollution
3. Person
4. Authority
5. Board
6. Control officer
7. State board
8. Emission
9. Department
10. Ambient air
11. Multicounty authority
12. Emission standard
13. Air quality standard
14. Air quality objective

ADMINISTERING AUTHORITY:

Department of Ecology
State Department of Health
Air Pollution Control Board
Local Governmental Units

AUTHORIZATIONS:

To delineate local air pollution regions;
To form multicounty air pollution authorities;
To control air pollution at the local and state levels;
To classify air contaminant sources;
To establish air quality and emission standards;
To issue variances;

To enter and inspect property in enforcement of the act;
To issue regulations pursuant to the act;
To act as the state lead agency in air pollution matters;
To issue permits for limited open burning;
To generally enforce the act.

PROHIBITED ACTS:

To cause or allow air pollution in violation of standards and regulations.

PENALTIES:

Fines of up to $250 and $250 per day or 90 days imprisonment.

WASHINGTON NOISE

TITLE:

Noise Control Act of 1974
Washington Code 70.107

PURPOSE:

To provide for the expansion of noise control activities and antinoise measures.

DEFINITIONS:

1. Department
2. Director
3. Local government
4. Noise
5. Person

ADMINISTERING AUTHORITY:

Department of Ecology

AUTHORIZATIONS:

To adopt maximum noise levels in identified environments;
To adopt noise performance and use standards;
To adopt motor vehicle noise standards.

PROHIBITED ACTS:

To violate any noise control regulations adopted pursuant to the act.

EXEMPTIONS:

Department can exempt recreational shooting, emergency, and law enforcement equipment.

PENALTIES:

General violation - fines of up to $100;
Motor vehicle violation - constitutes a misdemeanor.

WASHINGTON PESTICIDES

TITLE:

Pesticide Application Act
Washington Code 17.21

PURPOSE:

To protect the future health and welfare of the people of the state through the regulation of pesticide application.

DEFINITIONS:

1. Agricultural crops
2. Apparatus
3. Board
4. Defoliant
5. Department
6. Desiccant
7. Device
8. Director
9. Engage in business
10. Fungi
11. Fungicide
12. Herbicide
13. Insect
14. Insecticide
15. Land
16. Nematode
17. Nematocide
18. Person
19. Pest
20. Pesticide
21. Plant regulator
22. Restricted use pesticide
23. Rodenticide
24. Snails or slugs
25. Weed

ADMINISTERING AUTHORITY:

Department of Agriculture
Pesticide Advisory Board

AUTHORIZATIONS:

To issue regulations pursuant to the act;
To classify and restrict pesticide use;
To generally enforce the act;

AUTHORIZATIONS (Cont'd):

To enter and inspect property in enforcement of the act;
To control transportation and disposal of pesticides;
To establish certification standards;
To categorize commercial applicators;
To certify commercial and private applicators.

CERTIFICATION OR LICENSING:

Applicators must demonstrate knowledge and be certified; six categories established.

PROHIBITED ACTS:

To engage in applicator business without proper license;
To violate the terms of any licenses;
To violate any regulations or act provisions.

EXEMPTIONS:

Forest owner, farmer owner applying to own land; government research.

PENALTIES:

First offense constitutes misdemeanor; subsequent offenses constitute gross misdemeanor.

WASHINGTON RADIATION

TITLE:

Nuclear Energy and Radiation Law
Washington Code 70.98

PURPOSE:

To provide for the regulation and safe maximum utilization of sources of ionizing radiation.

DEFINITIONS:

1. Byproduct material
2. Ionizing radiation
3. General license
4. Specific license
5. Person
6. Source material
7. Special nuclear material
8. Registration
9. Radiation source

ADMINISTERING AUTHORITY:

Department of Social and Health Services
Department of Commerce and Economic Development
Advisory Council on Nuclear Energy and Radiation

AUTHORIZATIONS:

To conduct studies and provide assistance regarding nuclear energy;
To gather research and information regarding nuclear energy;
To act as the state lead agency in radiation matters;
To evaluate ionizing radiation hazards;
To issue regulations pursuant to the act;
To issue general and specific licenses for radioactive materials and radiation sources;
To register all sources of ionizing radiation;
To enter and inspect property in enforcement of the act;
To require keeping of records regarding radiation;
To impound radiation sources in emergencies.

PROHIBITED ACTS:

To use, manufacture, produce, transport, own or possess unlicensed or unregistered sources of ionizing radiation;
To use fluoroscopic shoefitting devices.

EXEMPTIONS:

Machines in stage of manufacture or transport; diagnostic and therapeutic uses; others by regulation.

PENALTIES: Violation constitutes gross misdemeanor.

NRC AGREEMENT STATE: Yes

WASHINGTON SOLID WASTE

TITLE:

Hazardous Waste Law
Washington Code

PURPOSE:

To provide for the proper handling and disposal of dangerous and hazardous wastes.

DEFINITIONS:

1. Department
2. Director
3. Disposal site
4. Dispose or disposal
5. Dangerous wastes
6. Extremely hazardous waste
7. Person
8. Pesticide
9. Solid waste advisory committee

ADMINISTERING AUTHORITY:

Department of Ecology
Solid Waste Advisory Committee

AUTHORIZATIONS:

To issue regulations pursuant to the act;
To regulate the disposal of hazardous waste;
To operate hazardous waste disposal sites;
To conduct studies and investigations relating to hazardous waste;
To provide technical assistance in hazardous waste disposal.

PROHIBITED ACTS:

To fail to inform disposal site operator when hazardous waste being disposed of;
To dispose of hazardous waste at a site other than one designated for that purpose.

PENALTIES:

Civil - fines of up to $1,000;
Criminal - violation constitutes a misdemeanor with fines of from $100 to $1,000 or one year imprisonment.

WASHINGTON SOLID WASTE

TITLE:

Model Litter Control Act
Washington Code 70.93

PURPOSE:

To accomplish litter control throughout the state through a permanent and continuous program of litter control and removal.

DEFINITIONS:

1. Department
2. Director
3. Disposable package or container
4. Litter
5. Litter bag
6. Litter receptacle
7. Person
8. Vehicle
9. Watercraft
10. Public place

ADMINISTERING AUTHORITY:

Department of Ecology
State Law Enforcement Officials
Department of Revenue

AUTHORIZATIONS:

To issue regulations pursuant to the act;
To develop and place uniform litter receptacles in the state;
To design and distribute uniform litter bags;
To collect an annual litter assessment based on manufacture and sales;
To administer the state litter control account.

PROHIBITED ACTS:

To discard or dispose of litter upon any public property or private property not owned by the person;
To fail to place litter receptacles when required;
To fail to have a litter bag in vehicle or watercraft

EXEMPTIONS:

No assessment for growing or raising of animal or animal products.

PENALTIES:

Violation constitutes misdemeanor and fine of $10;
Violator can be ordered to cleanup any litter which that person discarded.

WASHINGTON SOLID WASTE

TITLE:

Solid Waste Management Act
Washington Code 70.95

PURPOSE:

To establish a comprehensive statewide program for solid waste handling and solid waste recovery to prevent land, air, and water pollution and to conserve the natural resources of the state.

DEFINITIONS:

1. City
2. Committee
3. Department
4. Director
5. Disposal site
6. Functional standards
7. Jurisdictional health department
8. Person
9. Solid waste
10. Solid waste handling

ADMINISTERING AUTHORITY:

Department of Ecology
Solid Waste Advisory Committee
Local Governmental Units

AUTHORIZATIONS:

To conduct studies and investigations regarding solid waste management, disposal and recycling;
To provide technical assistance to local governmental units;
To encourage recycling in local programs;
To develop local solid waste management plans;
To approve and permit local solid waste management plans;
To administer funds for local programs.

PROHIBITED ACTS:

To dispose of solid waste other than at a proper disposal site;
To violate any other act provisions.

EXEMPTIONS:

Disposal of own waste on own property.

PENALTIES:

Violation constitutes a misdemeanor.

WASHINGTON WASTE WATER

TITLE:

Domestic Waste Treatment Plants Certification Law
Washington Code 70.95B

PURPOSE:

To protect the public safety and the environment by providing for the certification of waste treatment plant operators.

DEFINITIONS:

1. Director
2. Department
3. Board
4. Certificate
5. Waste treatment plant
6. Operator
7. Nationally recognized association of certification authorities

ADMINISTERING AUTHORITY:

Department of Ecology
Water and Waste Water Operator Certification Board of Examiners

AUTHORIZATIONS:

To issue regulations;
To issue regulations pursuant to the act;
To classify all waste treatment plants;
To certify all waste treatment plant operators;
To generally supervise and enforce the act.

CERTIFICATION OR LICENSING:

Operators in charge of day-to-day operation of waste treatment plants must be certified in a classification corresponding to that of the facility;
Examination normally required except for prior operators.

PROHIBITED ACTS:

To operate a waste treatment plant without a properly certified operator in charge;
To perform the duties of an operator without proper certification.

PENALTIES:

Violation constitutes misdemeanor; fines of up to $100.

WASHINGTON WASTE WATER

TITLE:

Water Pollution Control Law
Washington Code 90.48

PURPOSE:

To maintain the highest possible standards and to ensure the purity of all waters of the state consistent with public health and public enjoyment thereof.

DEFINITIONS:

1. Person
2. Waters of the state
3. Pollution
4. Commission
5. Director

ADMINISTERING AUTHORITY:

Department of Ecology

AUTHORIZATIONS:

To issue regulations pursuant the act;
To bring legal actions to enforce the act;
To enter and inspect property in enforcement of the act;
To act as the state lead agency in water pollution matters;
To administer a pollutant discharge permit system;
To issue waste disposal permits to local governmental units;
To prepare a comprehensive water pollution control and abatement plan;
To administer the state construction grant program;
To investigate oil discharges into waters of the state;
To supervise the cleanup of any oil discharges;
To establish water quality standards.

PROHIBITED ACTS:

To cause or allow any discharge into waters of the state causing pollution to such waters;
To violate the terms of any disposal or discharge permit;
To discharge any oil into waters of the state;
To fail to report or take cleanup actions regarding oil discharges;
To violate any other provisions of the act or orders issued pursuant to the act.

PENALTIES:

Willful violations - fines of up to $10,000 or one year imprisonment;
Additional fines of up to $5,000 per day;
Liability also imposed for damage caused to fish or wildlife;
Liability imposed for expenses involved in oil discharge cleanup.

WASHINGTON WASTE WATER

TITLE:

Water Resources Act of 1971
Washington Code 90.54

PURPOSE:

To set forth fundamentals of water resource policy for the state, to ensure that waters of the state are protected and fully utilized for the greatest benefit to the people of the state.

DEFINITIONS:

1. Department
2. Utilize
3. Utilizations

ADMINISTERING AUTHORITY:

Department of Ecology

AUTHORIZATIONS:

To develop and implement a comprehensive state water resources program;
To issue regulations pursuant to the act;
To make water resource reports to the state legislature;
To generally supervise the utilization and management of waters of the state according to guidelines set forth in the act.

WASHINGTON ENERGY

TITLE:

State Energy Office Law
Washington Code

PURPOSE:

To foster wise and efficient energy use and to promote energy self-sufficiency through the use of indigenous and renewable energy sources, and to protect environmental quality.

DEFINITIONS:

1. Energy
2. Person
3. Director
4. Council
5. Distributor
6. Energy facility

ADMINISTERING AUTHORITY:

State Energy Office
Energy Advisory Council

AUTHORIZATIONS:

To maintain data on state energy supply, needs and projections;
To act as the state lead agency in energy matters;
To develop state conservation plans and energy contingency plans;
To advise other state agencies on energy matters;
To coordinate all state energy activities;
To issue regulations pursuant to the act;
To advise on energy curtailment or allocation plans.